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DEVELOPMENT OF FIELD METHODOLOGY AND PROCESSES
FOR
TASK ANALYSIS AND TRAINING FEEDBACK

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Fred L. Hart
Donald R. Jones
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The research product was based on repair of vehicle end items and encompasses the Maintenance Control Section and Automotive Maintenance Section of a Direct Support Company.

The system was based on a study of the Maintenance Control Section and Automotive Section of two Direct Support companies. It was implemented in one of the units studied. They welcomed this system as a means of keeping accurate account of their operation--essentially allowing them to meet doctrinal objectives.

This research is a report of initial work in the area of maintenance performance research. It is useful as a resource document. A complete report will be published in 1981.

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BRIEF

The objective of the research effort was to develop a Training Feedback Management Information System. The system objectives were to provide information usable to multiple levels of command including schools. It was to be a tool for management. The unit of information on training was to be larger than a task but smaller than a job and, if possible, a unit that could be unpacked for different command skills.

The research product does provide a unit of reporting that can be unpacked for use by different levels of command and by the schools. It also provides an index of the effect that failure to perform the tasks to standards has on unit effectiveness--at the different levels (for management actions).

The research product was based on the repair of vehicle end items and encompasses the Maintenance Control Section and Automotive Maintenance Section of a Direct Support Company. It has the following components:

1. A data system that is built around the work flow process. The work flow process is divided into job or work segments. The time every vehicle end item spends in each work segment is recorded and becomes an index on unit effectiveness and establishes the structure to fault isolate training deficiencies. These work segments are:
 - a. Date Submitted - Date Received
 - b. Date Received - Date Parts Ordered
 - c. Date Parts Ordered - Date Parts Received

- d. Waiting Shop - Time in Shop
 - e. Time in Shop - Out of Shop
 - f. Out of Shop - Final Inspection
 - g. Final Inspection - Pick-up by Unit.
2. An audit system for tracing (unpacking) from any job segment that is out of standard, to the task(s), person(s), unit(s), and section(s) performing the task that caused the job segment time to not meet standard.
 3. An algorithm to analyze the data, trace deficiencies and identify training needs.

The uses of the results of the Training Feedback Management Information System called the Work Measurement Analysis System (WMAS) in this particular application are:

1. Identify all tasks performed by personnel in each MOS and job duty by skill levels (for preparing a Soldier's Manual for the school's use).

NOTE: As part of the research effort an analysis of tasks listed in existing Soldier's Manuals for the 63H MOS was made against ARTEP mission and task requirements. The analysis consisted of (a) an evaluation between ARTEP tasks and Soldier's Manual tasks and (b) an evaluation of duty position to Soldier's Manual tasks by skill level. The interface or compatibility between the two documents was found to be inadequate.

2. An index of criticality of each task performed in units in terms of frequency and effect on unit effectiveness (but not including injurious effect of sub-standard performance) for use by unit commanders and schools.

3. A means for unit supervisors and commanders at all levels to identify sub-standard performance and further determine the job segment, task, and individual responsible for that performance.
4. For use as an ARTEP for peacetime conditions the system satisfies all the objectives of an ARTEP and provides behavioral and unit effectiveness data from many months of operations--rather than from a few days of an ARTEP application.

NOTE: This would allow the ARTEP to be used exclusively to simulate combat conditions and collect data on unit effectiveness and tasks performed under combat conditions.

The system is entirely consistent with doctrine. It fulfills requirements of doctrine that are probably not being accomplished in units today. It uses the existing TAMMS system as the basic data collection system. It requires the addition of a minor amount of data that is not typically recorded in TAMMS--but which is required by doctrinal objectives. It provides a different form of analysis of data (by job segment) than the typical NORS/NORM form of analysis. The TFI system analysis requires about three hours of additional work by the unit clerk--but it also codifies the data collection effort in a unit to such an extent that many more hours of working time are saved than added.

The system was based on a study of the Maintenance Control Section and Automotive Section of two Direct Support companies. It was implemented in one of the units studied. They welcomed this system as a means of keeping accurate account of their operation--essentially allowing them to meet doctrinal objectives. The research study was completed at the time

when the implementing unit had collected about one month of data with the system. Its usefulness for achieving the training information uses of the system was not evaluated with this brief implementation.

Recommendations

1. Implement the system in Direct Support units on a controlled basis.
 - a. Initial implementation of four CONUS units.
 - b. Collect data and opinions of unit personnel during operations.
 - c. Correct any deficiencies or "glitches" in the system on the basis of initial implementation.
 - d. Implement system selected units in CONUS and USAEUR (approximately twenty units).
 - e. Correct deficiencies.
 - f. Implement the system worldwide.
2. Utilize the units using the system in the external evaluation of the Skill Performance Aids (SPA) (previously ITDT) which will be fielded as training and technical documentation for track and wheeled vehicles in the 1980 timeframe. Data would be collected immediately on unit performance levels and training deficiencies in units operating with training and technical documentation used today to serve as a baseline of comparison for unit effectiveness and training deficiencies after the SPA materials are delivered to units where the system has been implemented.

SUMMARY

Work Measurement and Analysis System

The Work Measurement Analysis System has several products. These are:

- 1) A training information feedback system
- 2) A tool for effective management control
- 3) A unit evaluation instrument (to satisfy ARTEP needs)
- 4) A set of valid tasks for Soldier's Manuals (including updates)
- 5) An identification of critical tasks training data bank for development by the Ordnance School

The system is in pilot test (a single user implementation).

The Work Measurement Analysis System is a Training Feedback Management System designed to assist a company commander and his key leader personnel in effectively managing and diagnosing training deficiencies in a complex organization--a Direct Support Company (242 men and 38 MOSs supporting the combat equipment of 4-5 battalions and attached companies) and providing feedback to schools on job tasks and training deficiencies in performing those tasks. Currently the system encompasses only the Maintenance Control Section and Automotive Repair Section. This represents one-third of a Direct Support Company's total complement.

The Work Measurement Analysis System has the following objectives:

- 1) To provide a management tool for an effective production control system.

- 2) To establish a framework for data collection which will provide:
 - a) a means for measuring the production of a unit.
 - b) a means for measuring technical ability of individuals.
 - c) a means to precisely pinpoint areas for which training needs exist.

The system contains the following components:

- 1) A recommended work flow for both local and on-site repairs.
- 2) Data collection instructions (types of data, persons responsible for collecting data, appropriate forms).
- 3) Shop officer computation instructions and analysis forms.
- 4) Inference analysis package for analyzing data and identifying specific training needs.
- 5) Company commander analysis form.

Items 2, 3, 4 and 5 represent the algorithm of the Work Measurement Analysis System.

The algorithm was developed to fault isolate managerial problems in general and to fault isolate production control and training deficiencies in particular by providing the shop officer with valid data obtained from day-to-day job performance. Most units operate under some type of constraint, e.g., manpower shortage--too few supervisors and limited equipment resources. The algorithm will provide a shop officer and maintenance control sergeant with information which can help offset existing limitations and identify training needs. Data is collected and analyzed on a weekly or monthly basis.

The system has a number of checks and balances which will indicate false or incomplete data. For example, the various types of data provide a check and balance. Inaccurate recording of job man-hours will not offset time in shop and may also result in a contradiction when compared to actual man-hours available.

The submission and report procedures provide another check and balance. Data must be submitted each week to the shop officer. Failure to receive complete sets of data is an indication to the shop officer that there is a failure in the production control system. The type of missing data indicates the location of the failure.

The algorithm will help the shop officer to be more responsive to outside queries about the status of his section and to doctrinal requirements regarding individual training. The requirement of the shop officer to compute and analyze the data allows the officer to evaluate on a regular basis, all aspects of his operation, pinpoint deficiencies (training or other), and select correct actions. His report to the company commander provides the commander a summary of that particular operation. This can be examined in-depth in areas where performance standards are not met in any reporting period.

The data collected in the Work Measurement Analysis System and reviewed by the shop officer consists of two types:

- 1) Critical Indicators. These are data which show that standard times in a work segment are not being met. This indicates a failure in the work flow process which may be caused by several factors.

- 2) Early Warning Indicators. These indicators identify specific time lapses in each work segment which are longer than the average-- but still within standards. Such indicators allow the shop officer to identify and correct a problem before it can adversely affect the production control operation.

The products of the Work Measurement Analysis System are identical to those of the ARTEP. These are:

- 1) Establish current effectiveness of unit operation.
- 2) Identify training needs which will bring unit up to peak operational effectiveness.

This similarity in objectives makes the Work Measurement Analysis System an ideal tool for preparing a unit for an ARTEP or as an ARTEP based on many months of data under peacetime conditions rather than a few days of data. This would allow an ARTEP to be used only for determining the response of the unit to simulated combat conditions. As the system is designed to provide continuous evaluation of unit operational effectiveness, as well as diagnose to individual causes, a commander and his unit managers will be able to be more responsive to operational deficiencies and identify the means, e.g. training, of correcting them.

The Work Measurement Analysis System also:

- a) Provides information as to which technical tasks are performed by duty position, and the frequency of performance by the various MOSs and duty positions in the Direct Support Maintenance unit (for use in preparing Soldier's Manuals and/or training courses or exportable training materials).

- b) Identifies administrative tasks needed by the MOSs.
- c) Provides doctrinal information such as adequacy of current staffing allocation of a Direct Support Company's Maintenance Control Section and Automotive Section as prescribed by T0&E.

The system can provide a framework for monitoring a soldier's technical ability and assist in preparing him for career progression.

- a) It will identify which individuals work on what tasks.
- b) It will identify satisfactory/non-satisfactory work performance for all skill levels.

This information will assure career personnel of being thoroughly trained in all areas. Consequently, career personnel should be more competent supervisors upon reaching that grade.

The system establishes the need and basis for the framework of a training model which would allow a Direct Support Company to conduct effective training which could be coordinated with day-to-day mission requirements.

The training model would allow for effective cross training and a formal OJT program which can provide instruction on both frequent and non-frequent tasks. It also would provide a means to identify an individual's training status, the supervisor who should guide his OJT, and the point where an individual would no longer need training for his skill level.

ARTEP/Soldier's Manual Interface

On the basis of a comprehensive review of the findings from the matrix analysis of ARTEP unit products by Soldier's Manual tasks as

performed under this contract, the following observation and conclusions are made about the ARTEP/Soldier's Manual Interface as it exists for the 63H MOS. The interface fails to match in many places as a result of inadequacies on the part of both documents. Elements of the ARTEP inadequacies are:

- 1) Inadequate mission/task distribution among the elements of a Direct Support Company.
- 2) Inadequate standards for a number of tasks.

The inadequacies in the Soldier's Manual are greater than those of the ARTEP and a revision of the Manual for the 63H MOS is suggested by the deficient elements. These are:

- 1) An incomplete administrative task listing.
- 2) Improperly stated administrative task statements.
- 3) Non-applicable administrative tasks.
- 4) Insufficient number of Direct Support level technical tasks.
- 5) Both technical and administrative tasks fail to address all duty positions.
- 6) Inappropriate task distribution among the skill levels.

These deficiencies in the Soldier's Manual, in the research staff's opinion, prevent the document from being an effective soldier evaluation and career progression instrument. The complete set of Soldier's Manuals for Skill Levels 1, 2, 3, and 4 is not an accurate sampling of the critical tasks actually performed within the duty positions currently allocated by TO&E.

The research staff feels that further examination of the Soldier's Manual is needed in order to make it more compatible with an ARTEP and to the tasks actually performed within the duty positions.

The following steps are suggested to accomplish this realignment:

- 1) A complete analysis of doctrine to identify unit missions, present staffing, and critical job tasks which are defined or implied by doctrinal documents.
- 2) Compare this analysis to the actual missions and tasks being performed in units.
- 3) Identify differences and discrepancies between the two and make recommendations as to whether doctrine needs to be changed or a training need exists to adequately prepare personnel to perform tasks which have been defined as critical to mission success.
- 4) Revise Soldier's Manual according to task analyses accomplished in Steps 1, 2, and 3. This would include:
 - a) identification of administrative tasks needed by each skill level to effectively perform within the various duty positions.
 - b) identification of technical organizational and direct support tasks which are essential to current mission requirements.
 - c) identification of less frequent tasks which are still essential to mission requirements and could be addressed in an OJT program.
- 5) Also revise ARTEP according to task analyses accomplished in Steps 1, 2, and 3. This would include:

- a) identification of unit missions, associated tasks, and all elements which contribute to each mission so as to effectively account for all duty positions.
- b) a complete identification of mission standards which would effectively evaluate unit missions through successful performance of critical tasks within the duty position. These tasks would be synonymous with the revised Soldier's Manual Task listing.

Successful implementation of this suggested procedure would result in the following:

- 1) The ARTEP will be a more effective tool for evaluating present unit capabilities and identification of shortcomings which impede operational readiness.
- 2) The Soldier's Manual will be a more effective tool for measuring individual ability.
- 3) There would be a reduced failure rate within an MOS because SQTs will be an accurate sampling of job-related tasks.
- 4) Promotions will be predominantly given to personnel who actually can perform tasks within a duty position.

SECTION I

INTRODUCTION

1.0 BACKGROUND

Reorganization of the Army's Enlisted Personnel Management System (EPMS) has produced new requirements for occupational training programs for the jobs and career progression options in EPMS. These new requirements have led the U. S. Army Training and Doctrine Command (TRADOC) to redirect its training toward increased emphasis on on-the-job training, non-resident instruction, and within unit training with a corresponding decreased emphasis in formal school training programs. This change in concept introduced many additional changes: emphasis on criterion-referenced testing, hands-on skill qualification tests, diagnostic tests to identify training weaknesses, Army Training and Evaluation Program (ARTEP), Soldier's Manuals, etc.

This new concept in training has placed increased responsibility on unit commanders at all levels for planning, implementing, and maintaining of both unit and individual training. Attendant to these responsibilities is the ability to determine unit and individual training needs. The research reported here was directed to providing the unit commander with a system for determining unit/individual proficiency and identifying training needs in Combat Service Maintenance Units.

1.1 Objective

The objective of this research effort was to develop a system that would monitor unit proficiency, identify deficiencies in unit operation, and diagnose those deficiencies to unit/individual learning needs.

Since the Army Training and Evaluation Plan (ARTEP) and Soldier's Manuals are unit/individual training guides, an additional objective of the research was to determine the extent of interface between these documents and the feasibility of using these documents and their interface in the development of a Work Measurement and Analysis System.

1.2 Scope

The system was developed for a Direct Support Company attached to a separate brigade and was limited to the selected company's Maintenance Control Section and Automotive Maintenance Section.

The interface analysis specifically addressed the Automotive Repairman, MOS 63H, the 73H duty positions within the Direct Support Company and the ARTEP (29-79) tasks related to the Maintenance Control Section and Automotive Maintenance Section.

1.3 Approach

The system was developed around the flow of automotive repair jobs through the Maintenance Control Section and Automotive Maintenance Section of a Direct Support Company. This was accomplished through a definition of the work flow process associated with a repair job. The process was then analyzed to identify critical points in the process, performance

measures, the means for measurement, and performance standards. Next, an algorithm was developed to trace from performances that did not meet standards back to the process step where the performance deficiency occurred, and thereby to identify specific areas of training deficiencies. The system, thus, consists of a definitized work flow process, a performance measure with associated standards, and an algorithm for tracing to deficiencies. The system is in trial implementation at an operational site for validation of effectiveness, usability, and possible revision.

Details of the work flow process are described in Section II of this report. Details of the algorithm, data collection and implementation are covered in Section III of this report.

1.4 Approach to Interface Analysis

An additional effort of part of this project was the analysis of the interface between the ARTEP for a Direct Support Company and the Soldier's Manual tasks for a 63H MOS within the Direct Support Company. An interface analysis was also performed between the 63H MOS Soldier's Manual tasks and the 63H MOS duty positions as defined within a Direct Support Company.

The ARTEP/Soldier's Manual interface analysis was accomplished through the use of matrices that matched ARTEP tasks associated with the Maintenance Control Section and Automotive Maintenance Section of a Direct Support Company with the Soldier's Manual tasks of the 63H MOS. Criteria for matching tasks were established based on the correspondence of tasks, task conditions, and task standards. Details of this analysis and findings are provided in Section IV of this report.

The Soldier's Manual/duty position interface analysis was also accomplished through the use of matrices. The matrices matched 63H MOS duty positions within a Direct Support Company to the 63H MOS Soldier's Manual tasks. Again, criteria for matching were established based on doctrinal duty position descriptions, task descriptions, task conditions, and performance measures. Details of this analysis and findings are provided in Section IV of this report.

SECTION II

WORK FLOW PROCESS

2.0 DESCRIPTION

The work flow process is a description of the sequence of personnel actions taken to repair a tank, track, or wheeled vehicle in a Direct Support Maintenance Company. This work flow process describes the work of the Maintenance Control Section, and the Automotive Maintenance Section, including the Mobile Maintenance Section of a Direct Support Maintenance Company. These Sections are highlighted in Figure 2-1, which depicts the organizational chart of the Maintenance Company.

The Maintenance Control Section includes a production control element, a technical inspection element, and a shop supply element. Production control sets the guidelines for the flow of forms within and between these Sections, the filing of forms on completed jobs, the scheduling of repairs for vehicles, the monitoring of the work flow, data computation, and in general, the setting of priorities for all work.

The technical inspection element is responsible for verifying the initial diagnosis of the vehicle and performing a final inspection after the vehicle has been repaired. The shop supply element maintains a parts stockage and orders parts.

The Automotive Maintenance Section is responsible for shop repair while the Mobile Maintenance Section is responsible for on-site repair. These sections' collective mission is to repair and return vehicles to the field as quickly as possible.

ORGANIZATIONAL CHART TOE 29-79

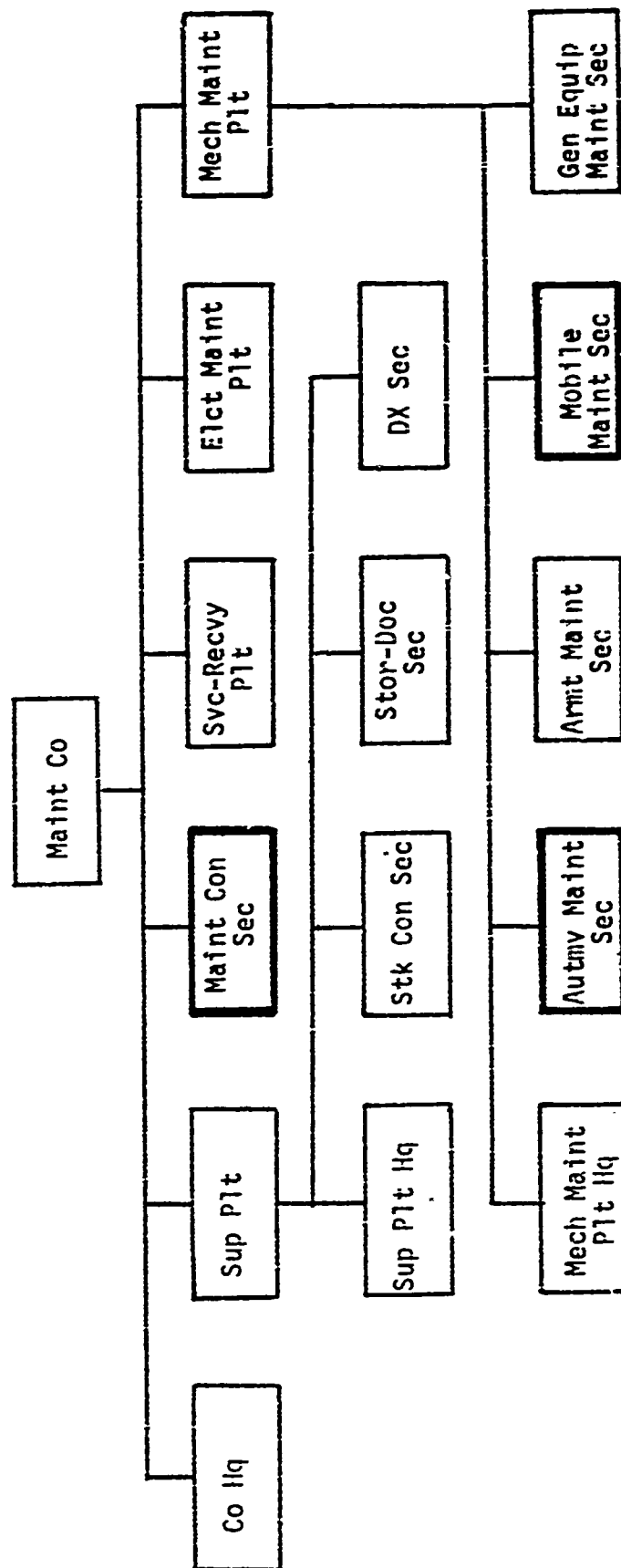
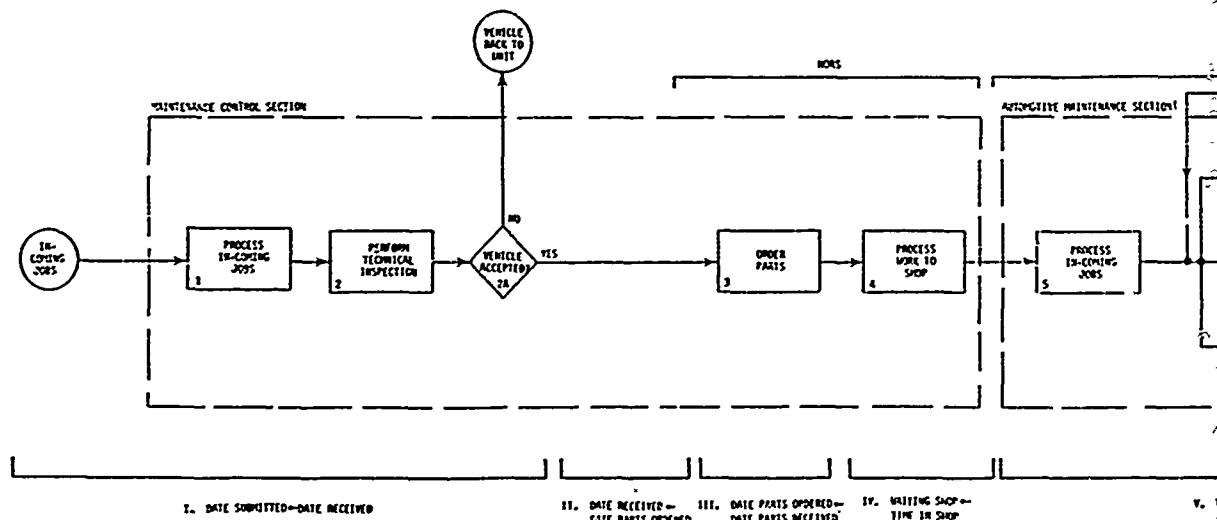


Figure 2-1
Maintenance Support Company Organizational Chart

Figure 2-2 is a flow chart of the sequence of personnel actions taken to complete a vehicle repair job. Portions of the flow chart have been enclosed by dashed rectangles and have been labeled by the name of the section responsible for those events. The Maintenance Control Section is responsible for those actions taken from the time the vehicle is submitted to the time prior to the vehicle entering the repair shop. The Automotive Maintenance Section is responsible for repairing the vehicle and preparing it for a final inspection. The Maintenance Control Section is again responsible for the actions taken from the time the vehicle comes out of the shop to the time the unit picks up the vehicle.

The sequence of events can be partitioned into seven work segments. That partitioning is shown in Figure 2-2, and marked by the Roman numerals I-VII. Each work segment is identified with easily determined beginning and ending times or dates when work events occur. The seven segments are defined as: I - Date the vehicle is submitted to the Direct Support Company to the date the vehicle is accepted (received) by the Company for repair; II - Date the vehicle is received to the date when parts are ordered; III - Date the parts are ordered to the date when the parts are received (waiting parts); IV - Date the parts are on hand to the date the vehicle goes in-shop (waiting shop); V - Date vehicle goes in-shop to the date vehicle goes out-of-shop (in-shop); VI - Date from out-of-shop to the date of final inspection; and VII - Date of final inspection to the date the vehicle is picked up by the unit.

WORKFLOW



WORKFLOW

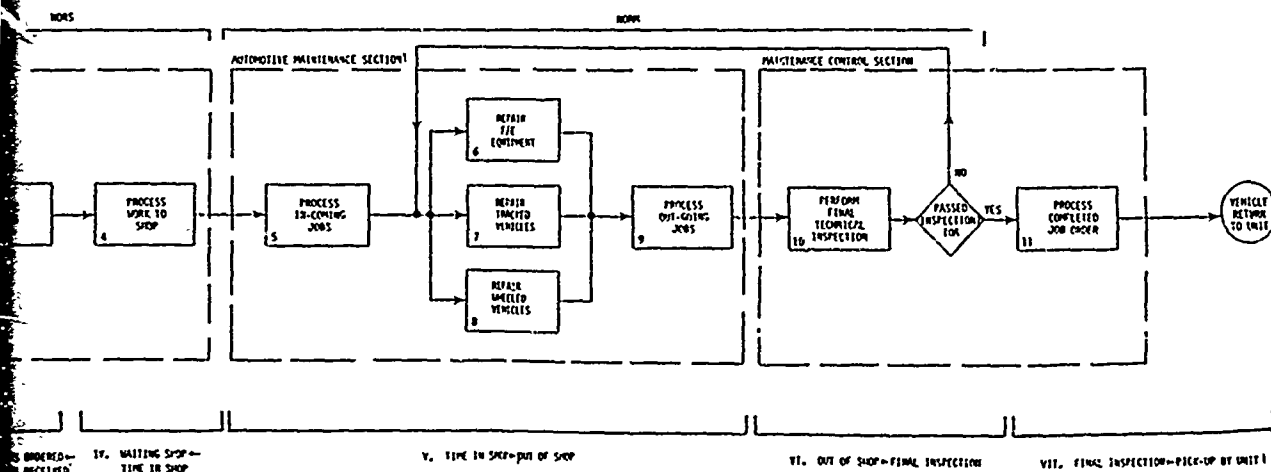


Figure 2-2
Work Flow Process Chart

2.1 Brief Description of Tasks and Form Flow within Work Segments

Figure 2-3 is a flow chart of the form flow. Each box contains the section or element handling the forms. The numbers in the Figure are the form numbers. For each form used in Figure 2-3, Figure 2-4 lists its number, title, and use. Refer to Appendix A for copies of forms.

Production Control, or the Shop Office, as it is commonly called, uses both a tub file and a production control board as tools to keep track of the job status.

The tub file is divided into bins labeled initial inspection, waiting parts, waiting shop, in process, final inspection, and completed. The packet of forms corresponding to the job's status is moved from bin to bin as the job progresses. The production control board has similar divisions. Tags for each job on the board are changed as the status changes. The board is used as a visual reference to keep track of each job's location. Figures 2-2, 2-3, and 2-4 can be used to follow the description of the tasks within each work segment.

Work Segment I. This segment begins when the organizational unit submits the vehicle and Form 2407 to the Shop Office Clerk of the Direct Support Maintenance Company. The Shop Office Clerk reviews the paper work, verifies the vehicle's presence, makes entries on the 2407, and sends the vehicle to the T.I. element. The T.I. initiates a 2404 and performs an initial technical inspection noting any organization level, as well as direct support, deficiencies. After the inspection, the T.I. either passes or fails the vehicle on the basis of whether there are maintenance deficiencies which are correctable at organizational level. Failed

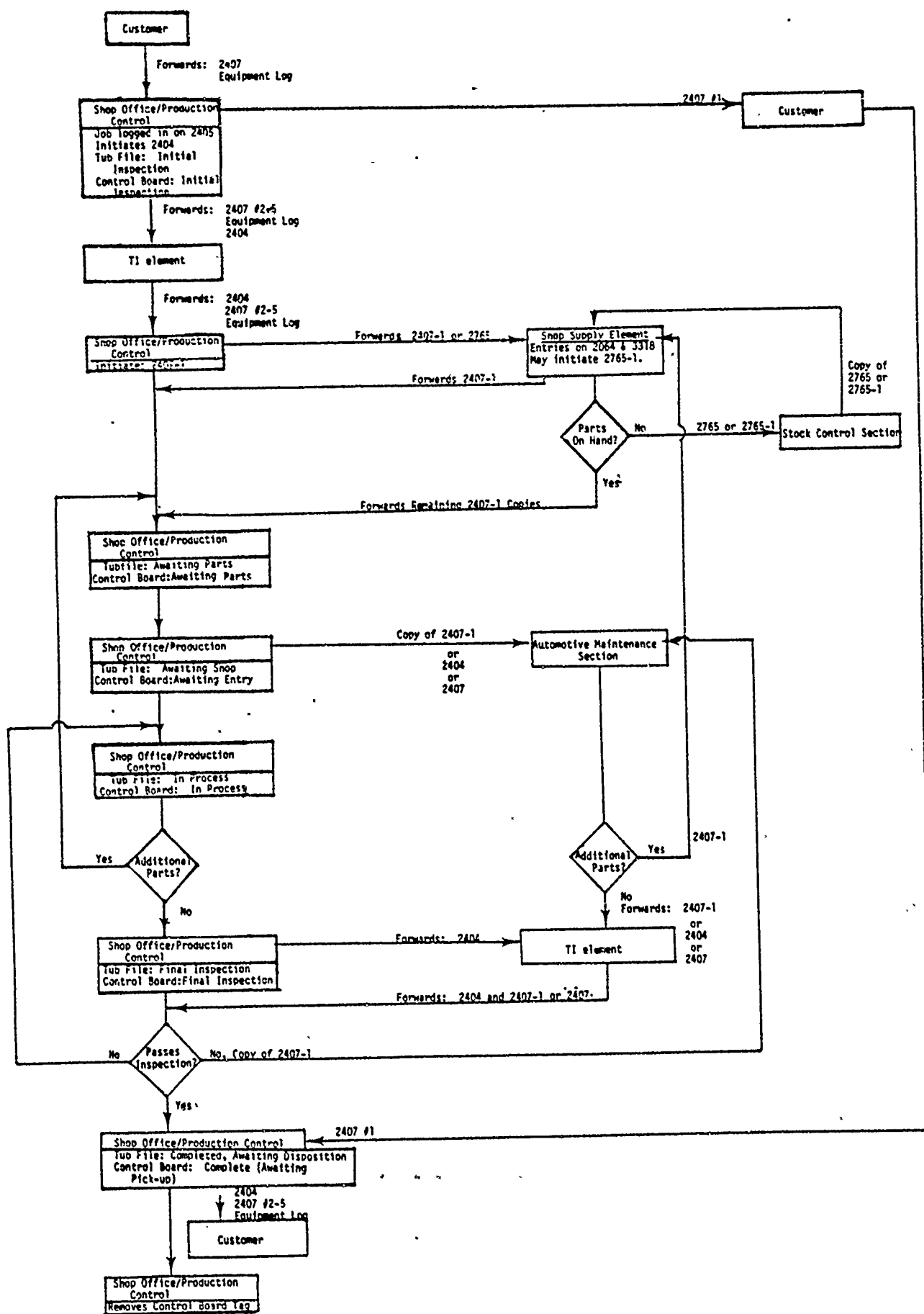


Figure 2-3

Form Flow According to Doctrine

FORMS

<u>Number</u>	<u>Title</u>	<u>Use</u>
829	Rejection Slip	T.I. uses form in rejecting vehicle after inspection
2064	Document Register for Supply Actions	Requested parts are logged in by Supply
2404	Equipment Inspection and Maintenance Worksheet	Used by T.I. to note needed repairs
2405	Maintenance Request Register	Jobs logged in by clerk in Shop Office
2407	Maintenance Request	The form unit fills out to submit vehicle. Also used by Shop Office to note work done and manhours expended.
2407-1	Maintenance Request, Continuation Sheet	Form is attached to 2407. Needed parts are listed
2765	Request for Issue or Turn-in	Preprinted form to request parts from Supply
2765-1	Request for Issue or Turn-in, Manual Form	Manual form used to request parts from Supply
3318	Record of Demands	Supply stockage demand. Used to determine stockage level of needed parts.
	Equipment Log	Carried in vehicle. A record of past repairs.

Figure 2-4. Summary of the Form Numbers, Titles, and Use of Forms in Work Flow

vehicles are sent back to the organization level for correction. If the T.I. passes the vehicle, part numbers are looked up for repair and entered on the 2404 or 2407-1. The T.I. returns the 2407, 2404, and 2407-1 to the Shop Office Clerk. The clerk makes entries on the 2407 and receives the vehicle.

Work Segment II. After the vehicle is received the Shop Office Clerk forwards the 2407-1 or 2765 to the Shop Supply Clerk to obtain the parts.

Work Segment III. The Shop Supply Clerk receives the paperwork, reviews the parts numbers, and makes entries on the 2064 and 3318. If parts are on hand, they are issued at that time. If parts are not on hand, they are ordered and the job remains in this work segment until the parts arrive. The parts are ordered by the Shop Supply Clerk who prepares the Forms 2765 or 2765-1 and forwards the form to the Stock Control Section. Once the parts are received from the Stock Control Section, the 2407-1 is forwarded to the Shop Office.

Work Segment IV. Once the Shop Supply Clerk receives the parts he notifies the Shop Office and places the package of parts in a bin labeled with the job order number. The job remains in this segment until the vehicle enters the Maintenance Shop.

Work Segment V. Shop Office transfers the 2404, 2407, or a copy of the 2407-1 to the Automotive Maintenance Section. Repairmen are assigned to jobs and the repairs on the vehicles in the Automotive Maintenance Shop are begun. An in-process inspection should occur to be sure the repairs are being performed correctly. After the repairs are completed, the Automotive Repair Foreman should inspect the vehicle and the Maintenance

Section Chief should list all completed repairs on the 2404, 2407, or the 2407-1. The job then goes out-of-shop and Work Segment VI begins.

Work Segment VI. The 2404, 2407, or a copy of the 2407-1 is forwarded to the T.I. element. The T.I. performs the final inspection and passes or fails the vehicle. If the vehicle fails the inspection, the vehicle is returned to in-shop, placing it back into Work Segment V. If the vehicle passes the final inspection, the job enters Work Segment VII.

Work Segment VII. Remaining paper work is forwarded to the Shop Office. The paper work is completed, the customer is notified, the customer picks up the vehicle, and the job is closed out.

For a detailed description of work flow according to doctrine, see Appendix B or FM 29023. For a more detailed description of the tasks within the work segments, see Appendix C, Activity Blocks.

2.3 How Doctrine and Field Practice Differ

While doctrine gives a general outline of procedures, it does allow for variations to meet local demands or situations. At both Fort Knox and Fort Benning preferred actions were not always followed, but were within allowable variations except where noted below.

Doctrine does not specify what actions should be taken when a vehicle is rejected at initial inspection for deficiencies that should be corrected at organizational level. The companies at both Fort Knox and Fort Benning sent the vehicle back to the submitting unit to have the deficiencies corrected. Both companies also combined their Automotive Maintenance Section and Mobile Maintenance Section into a single Automotive Maintenance Section.

SECTION III

THE ALGORITHM FOR THE WORK FLOW PROCESS

3.0 INTRODUCTION

An algorithm was developed for the work flow process to provide the shop officer and company commander with a diagnostic tool to more correctly fault isolate problems by providing them with more knowledge and control over operations than they now have.

Typically, the only data used by the company commander and the shop officer to make decisions are NORS (time non-operationally ready supply), NORM (time non-operationally ready maintenance), data on the daily status report (number of vehicles received, number of vehicles awaiting parts, number of and reasons for vehicles in-shop, number of vehicles awaiting pick-up) and authorized versus actual manpower loading. In addition, the shop officer typically has data listed on a production control board which lists the location and status of all jobs in the work flow. The production control board is a visual aid enabling the shop officer to readily summarize the number of vehicles within each work phase.

The NORS time can be determined from the dates recorded by the shop office clerk on the 2407. According to TM 38-750, NORS is computed by subtracting the date vehicle is received (block 24) from the work started date (block 25). See Form 2407 in Appendix D. The NORM time can be determined from the dates recorded by personnel in the

Automotive Maintenance Section on the 2407. According to TM 38-750, it is computed by subtracting the work started date (block 25) from the final inspection date (block 26).

The data for the daily readiness report come from the production control board. Each job should be on the board and listed either as in initial inspection, awaiting parts, awaiting shop, in-shop, final inspection, or completed. The shop officer or personnel in the shop office determines the total number in each category and lists these totals on the daily status report.

NORS is determined by subtracting the received date from the work started date. By referring to the work flow in Figure 2-2, it can be seen that NORS actually represents the time taken in work segments II, III, and IV. NORS should represent only III, time delay due to supply. Segments II and IV are production control's responsibility not supply's. Similarly, NORM represents the total time of V and VI. NORM should represent only V, in-shop to out-of-shop time. The T.I. element has responsibility of VI, perform final inspection. NORM and NORS time are not valid representations of delays due to supply and repairs, respectively. Optimal decisions concerning efficiency cannot be made if the shop officer does not have realistic and valid data about the amount of time taken in each work segment. The data to determine the amount of elapsed time within each work segment are currently recorded on existing forms. Valuable data are there but are not in usable form. NORS and NORM are the only elapsed time measures currently being measured. There is the need for elapsed times for work segments I, II, IV, VI, and VII.

Currently there are no data to identify which individuals need training on what tasks. There is no way to determine the productivity of T.I.s, productivity of mechanics, manpower utilization, or the long term effects of the quality of repairs.

The algorithm was developed to provide this necessary knowledge and control. It consists of a data collection/analysis process and diagnostic.

The data collection/analysis process carefully controls the job and form flow and specifies what data should be collected. The process extends the scope of the existing data collection system by collecting data from areas not presently covered and by making new computations on existing data.

The diagnostic allows the shop officer to better keep abreast of the status of his units. It does this by providing information on the time spent during each aspect of the repair operation, manpower utilization, productivity, detection of training deficiencies, a means of insuring a soldier in career progression of obtaining the necessary skills, a means of obtaining and summarizing actual field data on the frequency of types of repair by vehicles, and a means of obtaining and summarizing actual repair times per type of vehicle.

3.1 Development of the Algorithm

The algorithm was developed by studying the work flow and form flow of the Maintenance Control and the Automotive Maintenance Sections as follows: (1) the work flow was partitioned into seven non-overlapping work segments (see Figure 2-1); (2) the tasks and the accountability for all work within each work segment were determined

(see Appendix C); (3) standards representing the maximum allowable time to accomplish all work within each work segment were established; (4) the data for the elapsed time computation within work segments were selected; (5) performance measures reflecting training needs and productivity were chosen; (6) existing DA Forms from which to transcribe the desired data were identified; (7) forms and procedures to transcribe the selected data were developed; and (8) analysis forms and their computational procedures were prepared.

The use of the algorithm begins with the recording of data for each job on currently used DA forms during the job flow process. These data are then transcribed to the algorithm forms. There are five forms associated with the algorithm (see Appendix D):

(1) Form A - used to collect critical dates in the work flow process, man-hour expenditures and availability, and repair task standards for each job.

(2) Form B - used to collect critical dates in the parts request process and parts request status data.

(3) Form C - an analysis form for recording work segment elapsed times, NORS and NORM data.

(4) Form D - an analysis form for recording repair man-hour expenditures, technical standards, and manpower availability.

(5) Commanders Form - used to summarize data from the analysis forms to provide its commander with an overall evaluation of jobs completed and in-process.

The following paragraphs detail the data collection, analysis and diagnostic process, and includes examples of the use of the algorithm.

3.2 Data Collection

Paragraphs 3.2.1 and 3.2.2 describe where in the work flow the actions occur from which the data are taken.

3.2.1 , Data Collection Form A. The organizational unit submitting a vehicle for repair enters the vehicle type and date submitted on the 2407. After verifying those entries the shop clerk forwards the 2407 to the T.I. element. The T.I. gives the vehicle an initial inspection and enters the number of man-hours spent on the inspection on the 2407. If the vehicle passes the T.I.'s inspection, the shop clerk assigns the vehicle a job order number and enters this information as well as the date the job order was received (or vehicle was accepted) on the 2407. If parts are needed the T.I. lists the parts and date ordered on the 2407-1. The 2407-1 is then forwarded to the shop supply. When the parts become available, the issued date is entered on the 2407-1.

The Mechanics Maintenance Section Chief enters the date the vehicle goes in shop on the 2407. Neither the date out-of-shop nor the number of training man-hours are currently recorded but that data could be entered on the 2404 when repairs are completed. The mechanics maintenance hours are recorded on the repair shop's 2404 after the job is completed. These man-hours are transcribed to the 2407 and to the shop office's 2405 by the shop clerk. The Technical Standard Each Job is not currently recorded by the shop office but this information would

be transcribed onto Form A by the shop clerk. After repairs are completed, the T.I. gives the vehicle a final inspection. The number of man-hours expended during this inspection are entered on the 2407. If the vehicle passes the inspection, the T.I. enters the date inspected on the 2407. If the vehicle fails, that failure is noted on the 329 and the vehicle is sent back in shop. After passing the final inspection the customer is notified that the vehicle is awaiting pick up. The date picked up is entered on the 2407 by the shop clerk when the customer accepts the vehicle.

The entries for the number of mechanics at 0800, number of mechanics at 1300, the number of T.I.s at 0800, and the number of T.I.s at 1300 are not currently recorded. These entries on Form A should be made daily by shop office personnel. This information can be obtained by telephone calls to the appropriate elements or sections.

3.2.2 Data Collection Form B. When parts are needed the shop supply clerk receives the 2407-1 from the shop office. The job order number, part numbers, and date parts ordered should already be on the form. If the parts are on hand, those part numbers are circled by the shop supply clerk. The shop supply clerk then requests that a signature and date be entered on the 2407-1 to acknowledge parts receipt.

If parts are ordered, the part numbers are verified against the shop supply's microfilm records. If there is a discrepancy, that information is recorded on Form B. The parts are then requested on a 2765 or 2765-1. After a variable waiting period, the shop supply clerk should receive a notice of the part's status. That status indicates the date the part should arrive. If the parts become overdue, the shop

supply clerk should then initiate a follow up action by filling out a AFI report. When the parts arrive, that date is entered on the 2064 log.

After repair work has started and there is a need for additional parts, those parts are entered on the 2407-1. The form is forwarded to the shop supply element once again. A document register number that gives the date of order of additional parts is entered on the 2407-1 and on the 2064 log. The same ordering procedures are again followed.

One of the shop supply clerk's duties is to maintain a certain level of stockage for parts that should be on-hand. That level is indicated on the shop supply's 3318. The reorder point date can be determined from the number of parts that are remaining and the parts issue date, also on the 3318. The date that the stockage is reordered is taken from the document register number on the 2064 log.

Another possible duty for the shop supply clerk is to keep track of the DX status. DX is a term used for the exchanging of an old part for a new one. The date of a request to pull the old component out of the vehicle is entered on the 2407-1 and the date that the old parts are turned in is recorded on the 2402.

3.3 Data Computations/Analyses

Once the data are on the data collection forms, computations can be made and those results entered on analysis forms C and D. Forms C and D are filled out on a weekly basis. All data for both analysis forms except the datum, "Number No Current Status," are taken from Form A.

3.3.1 Form C. Form C summarizes the number of vehicles in-process, number completed, number of part requests having no current status, and the elapsed work segment times. Form D includes summaries of repair data, available man-hours, and actual mechanic and T.I. man-hours expended. The Company Commander's Analysis Form requires no additional computations. All data on his form is transcribed from the C and D analysis forms.

The data on Form C are presented by vehicle category, wheel, track, and tank. The vehicle type is determined by the alphanumeric code in the Vehicle Type column, e.g., M50A1. The Number Received is determined by counting the number of entries by vehicle type in the column labeled Date Job Order Received on Form A. The Number in Process NORS has a date for parts ordered but no date for parts received. Number Completed (#). NORM has both an in-shop date and an out-of-shop date. Number in Process NORM has an in-shop date but no out-of-shop date. The entries for Number No Current Status are determined by the number of blanks found on Form B under the Status of Part column. The remaining entries are elapsed time measures.

To determine whether an immediate problem exists using work segment elapsed times, the following steps are taken: (1) elapsed times are computed for each job by vehicle type from Form A within each work segment; (2) average elapsed times are determined for each work segment for the week and entered on Form C; (3) these averages are then compared to the standard for each particular work segment. If the average elapsed time exceeds the standard the shop officer

immediately knows a problem exists within a particular work segment. If the standard is exceeded, the diagnostic algorithm booklet in Appendix E lists possible reasons for each work segment why that elapsed time was so long. For each possible reason, there are one or more additional data sources the shop officer should check. By checking these additional data sources the reason(s) can be rejected or confirmed. When the reasons are determined, action can be taken to rectify the problem. In general, Form C summarizes for the shop officer the number of vehicles in each work phase and the average time a vehicle spends within each work segment.

3.3.2 Form D. The Total Maintenance Hours by vehicle type are summed from Form A. The Mean Maintenance Hours per Job is computed by dividing the total maintenance hours for each vehicle type by the number of jobs that have been complete by vehicle type. The same procedures are used for the corresponding Total Technical Standard Hours and Mean Technical Standard per Job. Mean Hours per Initial Inspection is computed by dividing the total number of initial inspection hours for each vehicle type by the number of each vehicle type. The same procedures are used to determine Mean Hours per Final Inspection. These data indicate the man-hours expended during the week and average time to repair each vehicle type. Training needs can be determined by comparing the technical standard number of man-hours to the actual repair man-hours. If the actual repair times are longer than the standard, either training for management or training for mechanics may be in order. It is recommended that a tallying system be maintained that counts the times a task is performed by each individual. Training and

non-training hours could be entered on an expanded Form A if it were felt it might be helpful. The corresponding mean training and non-training hours would then be computed.

The man-hours available on Form A are computed by taking the number of personnel available and multiplying that run by three. The three hours on Form B represents the expected number of working hours available in the morning and the afternoon. The utilization of mechanics and T.I.s is calculated by dividing the number of man-hours expended by the number of available man-hours. Low utilization could indicate a need for better manpower utilization or it could indicate a slow period. A slow period can be verified by checking the number of vehicles received. The shop officer could take advantage of a lull by using the time for additional training or other necessary duties.

3.3.3 Form B. Form B is sent to the shop officer each week. The form measures the shop supply clerk's efficiency by the levels of stockage, elapsed times between date a reorder point is reached and the date of reorder, elapsed time for follow up requests. The shop officer should also look at the need for additional parts; this measure is a check on either the quality of T.I. initial inspection or quality of the mechanic's abilities. If T.I. makes a wrong initial diagnosis, the need for additional parts will show after the vehicle goes in-shop. If the mechanics break parts during the repairs, there will be a need for additional parts. Form B also indicates how quickly the old items to be DXed are turned in. In order to keep direct support DX storage up, the old items are taken in and then are exchanged at General Support. If direct support is slow in getting the old components

turned in, the direct support DX stockage will get low and possibly get to zero. No items in stock will increase the NORS time.

Discrepancies between part order number and microfilm could indicate an inability to use the parts library or that the parts library is not up-to-date.

Form B also can notify the shop officer that the shop supply clerk may be having problems outside his control. Not receiving status, long delays in receiving status, and parts not being delivered on time all have an adverse impact on the entire operation.

3.3.4 T.I. A form for the T.I.s could be developed. However, it is recommended that they file the 2404 as each job is closed out. From the filed 2404s, a tallying system could be devised to determine the number of repaired vehicles by company and the number of vehicles by company failing initial inspection. Large numbers of either measure could be indicators of either poor organizational maintenance or vehicle abuse. In either case, the shop officer should be notified so action can be taken to correct these deficiencies. Correction of these deficiencies would lessen the work load on the maintenance shop.

3.3.5 Company Commander's Analysis Form. The company commander's analysis form gives the critical mean performance measures for the month. All data for this form are transcribed from Forms C and D. The form indicates the number received, the status of the jobs in-process, the means for completed job, and the manpower allocation and shop efficiency. These data give the company commander more complete performance measures than he now receives.

This algorithm provides a good basic system for control and accountability. There are many variations that could be developed. The types of ideas contained in this system could be modified, expanded, or reduced to meet local demands. Figure 3-1 is a summary of the forms. For each algorithm form, the figure summarizes which DA Forms are used, who records the data, to whom the algorithm forms are sent, and how often each algorithm form is sent. Figure 3-2 is a summary of the accountability and standards for each work segment. Figure 3-3 is a summary of the steps of the diagnostic algorithm.

3.4 Examples of Use of the Algorithm

Three examples will demonstrate the use of the diagnostic algorithm. These data are from a field visit to a direct support maintenance company. The first example identifies an excessively long elapsed time within a work segment. The second example identifies training needs in the Automotive Maintenance Section. The data in the third example should alert the shop officer that immediate action should be taken to prevent major problems in the near future. In all cases, summarized field data are compared to a standard. When standards are exceeded the shop officer is immediately aware of these problems.

3.4.1 Example 1. The first example demonstrates how the algorithm can more finely and correctly diagnose a problem within the workflow than is now possible. The following steps are needed to use the algorithm. First, the data are recorded on Army forms; second, data are transcribed to Data Collection Form A; third, computations are made on the data from Form A; and finally, results of the computations are entered on Form C. The column labeled "NORS II + III + IV" represents

<u>Data Collection Forms</u>	<u>Taken From DA Forms</u>	<u>Who Records</u>	<u>Sent To</u>	<u>How Often Sent</u>
A	2405, 2407, 2407-1, 829, Std Man-Hour Guide	Shop Clerk	Shop Officer	Weekly
B	2064, 2402, 2405, 2407, 2407-1, 2765, 2765-1	Shop Supply Clerk	Shop Officer	Weekly
<u>Analysis Forms</u>	<u>Computations Done By</u>	<u>How Often Computed</u>		
C	Shop Office	Weekly		
D	Shop Office	Weekly		
<u>Summary Form</u>	<u>Transcribed By</u>	<u>How Often Sent</u>		
Company Commander	Shop Office	Monthly		

Figure 3-1

Summary of the Data Collection,
Data Analysis, and Company Commander's Forms

<u>Work Segment</u>	<u>Accountability</u>	<u>Standard in Days</u>
I	Production Control & TI Elements	1
II	Production Control Element	2
III	Shop Supply Element	varies
IV	Production Control Element	1
V	Automotive Maintenance Section	varies
VI	TI Element	1
VII	Production Control Element and Organization Unit	1

Figure 3-2

Summary of Accountability and Standards for Each Work Segment

1. Collect data.
2. Compute elapsed times
3. Determine productivity and manpower performance measures.
4. Determine if standards have been exceeded.
5. Refer to diagnostic booklet for possible reasons why the standard was exceeded.
6. Check additional data sources to narrow possibilities.
7. Determine problem and consult with responsible element or section.
8. Take action to rectify problem-

Figure 3-3
Summary of Steps of the Diagnostic Algorithm

NORS time as defined by Army doctrine. That NORS time is 2.0 days for track vehicles. The shop officer and company commander would assume those two days are delays in obtaining supply parts. As noted before, the NORS work segments for the algorithm have been separated into three work segments. The average number of days the vehicle resided within each of the three work segments can be determined by looking in the track row under the columns labeled "II, " "III," and "IV." The average number of days in work segment II was zero, in III it was zero, and in IV it was two days. As previously discussed, IV, waiting shop to in-shop, is production control's responsibility not supply's. NORS time should be calculated by the time spent within only work segment III. The algorithm indicates the delay as being production control's. NORS says it was supply's.

3.4.2 Example 2. The second example identifies training needs. The necessary steps are: record data on Army forms, transcribe data to Data Collection Form A, make computations on data, and enter results of computations on Forms C and D. In checking average time per work segment, the average number of days in work segment V, in-shop to out-of-shop, was 3.7 days for wheeled vehicles. The algorithm booklet is used to determine the reason for this long repair time. The page in the booklet labeled "V. Primary Measure: Time In Shop to Out of Shop" corresponds to this work segment. This page lists several possible reasons for the long repair time. One of those reasons listed is 2.a. lack of technical ability of the repairmen. To verify this reason, the average job repair time should be compared to the technical standard. That information is located on Form D. On Form D, the mean maintenance

hours per job was 10.5 hours while the mean technical standard per job was 5.5 hours. The repairs took almost twice as long as the suggested standard, presumably because the repairmen need training on some of these tasks. Individual times per job can be determined by going back to Form A and looking under Mech Maint Hours column. That column lists repair hours for each job. That repair time can be compared to the "Tech Std Each Job" hours on Form A on that same row. Those comparisons show which jobs exceeded the standards. Immediate training could begin for those types of repairs.

An additional datum used to verify that the long repair time could be due to the need for training is the actual versus authorized manpower loading. Figure 3-4 lists that loading. As mentioned earlier, the Mobile Maintenance Section was merged with the Automotive Maintenance Section. Therefore, this discussion will treat them as a single section. Also, note that the 63H MOS should be able to do the work of the 63B MOS. The discussion will be limited to these MOSs since the example is concerned with wheeled vehicles. A summary of H and B MOSs for the two sections shows:

<u>Grade</u>	<u>Authorized</u>	<u>Actual</u>
E-7	2	0
E-6	3	3
E-5	7	8
E-4	20	8
E-3	19	20
E-2	0	8

MAINTENANCE CONTROL SECTION

DUTY POSITION	GRADE	MOS	AUTHORIZED Strength			GRADE	MOS	ACTUAL STRENGTH
			1	2	3			
Maintenance Control Officer	LT	77A00	1	1	1	LT	77A00	1
Maintenance Control Sergeant	E7	63H40	1	1	1	E7	63H40	1
Technical Inspector	E6	63H30	2	2	2	E6	63H40	2
Equipment Maintenance Clerk	E4	76D10	1	1	1	E4	76D10	1
Material Supplyman	E4	76D10	2	1	-	E3	63H10	1
Records Clerk	E3	71L10	1	1	1	E2	45K10	1
Armament Maintenance Inspector	E6	45K30	1	1	1	E6	45K30	1
Field Radio Repairman Inspect.	E6	31E30	1	1	1	-	-	-
Shop Supply Foreman						E5	63H20	1
Track Inspector						E4	63C10	1

MECHANICAL MAINTENANCE PLATOON HEADQUARTERS

Platoon Leader	LT	77A00	1	1	1	--	-	-
Platoon Sergeant	E7	63H40	1	1	1	E7	63H40	1

AUTOMOTIVE MAINTENANCE SECTION

Maintenance Technician	WO	63ZA0	1	1	1	WO	63ZA0	1
Section Chief	E7	63H40	1	1	1	--	-	-
Automotive Repairman Foreman	E7	63H40	1	1	1	--	-	-
Automotive Repairman	E5	63H20	4	4	4	E5	63H20	5
Automotive Repairman	E4	63H10	7	7	7	E4	63H10	7
Automotive Repairman	E3	63H10	11	10	8	E3	63H10	11
F/E Systems Repairman	E5	63G20	2	2	2	E5	63G20	2
F/E Systems Repairman	E4	63G10	3	3	3	E4	63G10	2
F/E Systems Repairman	E3	63G10	2	2	2	E3	63G10	1
						E2	63G10	2
Track Vehicle Mechanic	E5	63C20	1	1	1	--	-	-
Track Vehicle Mechanic	E4	63C10	3	3	3	E4	63C10	3
Track Vehicle Mechanic	E3	63C10	2	2	1	E3	63C10	4
						E2	63C10	3
Wheeled Vehicle Mechanic	E4	63B10	1	1	1	--	-	-
Wheeled Vehicle Mechanic	E3	63B10	2	2	2	--	-	-
						E2	63H10	8

MOBILE MAINTENANCE SECTION

Automotive Repairman Foreman	E6	63H30	3	3	3	E6	63H30	3
Automotive Repairman	E5	63H20	3	3	3	E5	63H20	3
Automotive Repairman	E4	63H10	9	9	9	E4	63H10	1
Automotive Repairman	E3	63H10	9	9	9	E3	63H10	9
Track Vehicle Mechanic	E4	63C10	3	3	3	--	-	-
Wheeled Vehicle Mechanic	E4	63B10	3	3	3	--	-	-

Figure 3-4

Authorized versus Actual Manloading

An E-2 is just out of school and an E-3 is still relatively inexperienced. This heavy loading of inexperienced personnel with a lack of E-7s who are charged with supervisory training duties would tend to substantiate the need for training for the repairmen.

3.4.3 Example 3. In the third example, the algorithm alerts the shop officer to a developing problem. In a review of Form B, the shop officer would find that the average time between the Date of Request for DX Pull and the DXed date was 17 days. Usual DX procedures call for trading in the old part to receive the new part. Here, the delay in turning in the old part after receiving the new part was 17 days. If this trend continues, stockage would be depleted causing unnecessary supply problems. The direct support DX replenishes its stock by DXing its old components for new components at General Support. This information would notify the shop officer that further investigation of the DX element is warranted.

3.5 Work Measurement Analysis System Implementation.

During September 25-28, 1978, members of the research staffed briefed the Commander, Delta Company, 197th Infantry Brigade and the shop officer on the Work Measurement Analysis System. The framework of the system, objectives, and benefits were discussed in detail.

A second briefing was conducted with the shop officer and the Maintenance Control Sergeant to explain the implementation procedures. This briefing included:

- 1) A recommended work flow process for vehicular equipment to be used in conjunction with the Work Measurement Analysis System (see Figure 3-5).

JOB FLOW	JOB PACKET CONTENTS	LOGS	OTHER FORMS USED	WORK SEGMENT MEASURES	
Office	2407	2405, PC Board, Tub File		I	Date Submitted to Date Received 1. TI Hours 2. Vehicle History
TI	2407, 2407-1, 2404(T)				
Office	2407, 2407-1, 2404(T)	2405, PC Board		II	Date Received to Date Parts Ordered Part Status, AFIs, DX Dates
Parts	2407, 2407-1, 2404(T)	2064	2765, 3318	III	Date Parts Ordered to Date Parts Received 1. Part Status 2. AFI Request Date 3. DX Pull Date to DX Date
Office	2407, 2407-1, 2404(T)	2405, PC Board, Tub File		IV	
Auto Shop	2407, 2407-1, 2404(T), 2404(S)	2405		V	Date In-Shop to Date Out-of-Shop 1. Tech Hours by Individual by Job 2. Tech Training Hours 3. Tech Manpower Availability 4. Job Rejections
Office	2407, 2407-1, 2404(T), 2404(S)	2405, PC Board, Tub File		VI	
TI	2407, 2407-1, 2404(T), 2404(S)		829		
Office	2407, 2407-1, 2404(T), 2404(S)	2405, PC Board, Tub File		VII	Date Final Inspection to Date of Unit Pick-up
Pick-up	2407				

Figure 3-5

Recommended Work Flow Process

- 2) An explanation of data collection forms associated with the Work Measurement Analysis System and procedures to accurately complete the forms.
- 3) An explanation of the shop officer computation and data analysis forms.
- 4) An explanation of how to use the Inference Document. This document relates the computed data to task deficiencies within an element(s) or specific duty position(s).
- 5) An explanation of the commander's form which is submitted to the Company Commander by the shop officer at the end of each month.

Working examples of all forms were provided to the shop officer to assist the implementation.

As the extent to which the Work Measurement Analysis System is actually implemented is at the unit's discretion, the research staff endeavored to show a need for the system.

An examination of historical data revealed a number of situations which demonstrated a need for the Work Measurement Analysis System.

This information was well received by the shop officer and Maintenance Control Sergeant. The following points were of particular interest:

- 1) The lack of accurate accountability of man-hours.
- 2) The high number of man-hours actually available to the unit.
- 3) The need for a more exact work flow process.
- 4) The need for Maintenance Control to acquire better coordination and accountability between the section in the work flow process.

Examples of all these points were discussed in detail and the key personnel concurred that the Work Measurement Analysis System could help increase unit effectiveness.

3.5.1 Implementation. The implementation of the Work Measurement Analysis System is to be accomplished by Delta Company without physical monitoring by the contractor. However, members of the research staff will be in telephonic communication with the shop officer during the unit implementation.

Also during the trial implementation, the research staff will obtain copies of the data and review the results with the Company Commander, Shop Officer, and Maintenance Control Sergeant.

Although not now scheduled, the research staff would like to make another trip to Delta Company support to extensively debrief key personnel involved with the implementation. The following points are of particular interest to the research staff.

- 1) Did the Work Measurement Analysis System reveal deficiencies in the unit's operation.
- 2) If so, were the deficiencies traceable to a specific element or duty position.
- 3) What adjustments were made to the unit operation based on findings from the Work Measurement Analysis System.
- 4) What modifications would the users make to the system to make it better.
- 5) Is the system a good tool for the company commander to maintain a current evaluation of effectiveness of his various support elements.

- 6) Is the system a good management tool for the shop officer.
- 7) Would the system assist a unit in maintaining a high degree of operational readiness so that the unit could pass an unannounced ARTEP.
- 8) Does the system help supervisory personnel address and track individual training needs.

3.5.2 Further Development of the Work Measurement Analysis System.

The research staff anticipates making revisions to the system based on Delta Company Support's observations and inputs.

It is suggested that the revised system be field tested at two support units in order to substantiate the usefulness of this type of system for Combat Support/Combat Service Support Units.

If the results from the field test are favorable, the research staff proposes the system be expanded to the F&E, Armament, Service and Recovery elements of a Direct Support Company.

An expanded Work Measurement Analysis System would provide a company commander with a constant evaluation of his internal operation and an accurate assessment of his unit's ability to provide effective combat support.

3.6 Work Measurement Analysis System/ARTEP Comparison

An analysis was performed to show the similarities and the differences of the Work Measurement Analysis System (WMAS) and the Army Training and Evaluation Program (ARTEP) as they apply to the work flow of vehicular end items through the Maintenance Control Section and the Automotive Section of a Direct Support Company (see Appendix F). Columns I through IV constitute the Work Measurement Analysis System.

Columns V and VI contain the ARTEP Mission task statements and corresponding standards.

Column I lists the activity blocks which make up the work flow process. This process has been defined by doctrine as the sequence of activities or steps which are necessary to repair a piece of equipment. Column II lists the duty positions which are responsible for the actions (task requirements) taken in each activity block. The tasks requirements for each duty position are also listed.

Column III contains three types of information:

- 1) Primary Measures which, if exceeded, indicate a breakdown in the work flow process.
- 2) Associated explanations which assist in fault isolating the activity block and duty position which may be contributing to any unsatisfactory performance.
- 3) Additional measures which can be used in conjunction with the explanations to precisely identify the duty position(s) which need training and the type(s) of training required.

Column IV lists the TAMMS Documents from which the data is collected in the work flow process and the corresponding data collection and analysis forms.

Column V lists the ARTEP mission task statements which correspond to a particular activity block of the work flow process.

Column VI lists the ARTEP standards for each of those ARTEP tasks and corresponding activity block.

WORK FLOW PROCESS	ARTEP TASKS												
	Maintain Production Control System 5-5	Maintain Shop Stock 5-11		Inspect Equipment 6-1	Perform Quality Control and Assurance 6-3	Maintain a Publications Library 6-4		Submit Workload Status Report by Section 7-2	Supervise TAMS and Supply Requirements 7-7		Repair Track Vehicles 8-5	Repair Wheeled Vehicles 8-6	Repair F/E Equipment 8-7
1. Process In-Coming Jobs	1			1,2									
2. Perform Technical Inspection				3	3	1,2,3							
2A. Vehicle Accepted	1,3,4			3	3	1,2,3							
3. Order Parts		1-6											
4. Process Work to Shop	1-5							1					
5. Process In-Coming Job Orders								1	1,2				
6. Perform F/E Maintenance									1				1-8
7. Perform Track Maintenance									1		1-8		
8. Perform Automotive Maintenance									1			1-8	
9. Process Out-Going Job Orders								1	1				
10. Perform Final Technical Inspection				4	1-3								
10A. Passed Inspection													
11. Process Completed Job Order	1-5												

WORK FLOW PROCESS ACTIVITIES VERSUS ARTEP TASKS/MEASURES

Figure 3-6
Summary of ARTEP/Work Flow Process Interface

A comparison of Column I, Activity Block Description, to Column V, ARTEP Task Statement, shows a primary similarity between the Work Measurement Analysis System and the ARTEP in that there is one or more ARTEP task statements for each activity block in the work flow process. For example, a comparison of activity block 2, "Perform Technical Inspection" and ARTEP Task 6.1, "Inspect Equipment" illustrates a match between the two approaches.

In the ARTEP, the unit mission "Maintain Quality Assurance and Control" has several tasks, one of which is 6.1 "Inspect Equipment." The responsibility for this task requirement is delegated to the Maintenance Control Section.

Comparing this task to activity block 2, "Perform Technical Inspection" shows:

- 1) A similarity of intent between ARTEP task and activity block description, and
- 2) a commonality between element responsible for the task and duty positions performing actions required in that activity block.

The similarity of the Work Measurement Analysis System and ARTEP is summarized by the matrix analysis in Figure 3-6.

Referring to Appendix F, a comparison of Column III, Work Measurement Analysis Performance Measures, and Column VI, ARTEP Standards, reveals the primary difference between the two documents. The ARTEP list standards for GO/NO GO task performance but in most cases these standards are not measures of productivity or effectiveness of task performance. Rather they are standards of procedures with emphasis on correct utilization of logs, TAMMS forms, and production control tools.

- 1) Example: One standard for ARTEP Task 6.1, Inspect Equipment, is inspection deficiencies are document on appropriate forms (DA 2404----). There is not a standard which addresses accuracy and completeness of inspection.
- 2) Example: ARTEP Task 5.5, Maintain Production Control System, has a standard "Units must maintain accurate production control system" which identifies exact location of all equipment and work requests. Whether or not the production control system is effective is not addressed in the standards associated with this task.

In the Work Measurement Analysis System performance measures are defined for GO/NO GO task performance for both the elements and the associated duty positions.

Data which is collected from daily Direct Support operations provides information on actual task performance. A comparison of this information to defined performance measures allows for evaluation of GO/NO GO task performance. The performance measures are derived from task statements in current doctrinal documents and critical points in the work flow process.

Like the ARTEP, the Work Measurement Analysis System demands correct utilization of logs, TAMMS forms, and production control tools. Accurate completion of these forms is necessary to record data on job task performance.

Likewise, in the first example, "ARTEP Task 6.1, Inspect Equipment," we find that the Work Measurement Analysis Sytem, in order to collect data on the task, also demands compliance with the ARTEP standard cited.

Additionally, the Work Measurement Analysis System addresses the accuracy and completeness of the technical inspection.

In activity block 2, Perform Technical Inspection, a failure to diagnose the correct third echelon deficiencies would result in additional parts and extended downtime. Also, failure to perform a complete inspection could result in a vehicle being returned to Direct Support for third echelon faults which should have already been repaired.

These types of situations on a frequent basis would constitute inadequate inspection of vehicular equipment. The Work Measurement Analysis System uses this type of information in the data base to evaluate the adequacy of the technical inspection being conducted. The system records additional parts needed by the job for each 30 day period. Also, a vehicle history, or a record of vehicles returned to Direct Support for the same or other third echelon deficiencies within 30 days is maintained for the same time frame. A high frequency of additional parts or returned vehicles over a month indicate probable technical deficiencies with the Technical Inspector Section.

In the second example, we have similar findings. The standard "Maintain Accurate Production Control System" for ARTEP Task 5.5, "Maintain Production Control System" is essential to collect data on production control effectiveness.

The Work Measurement Analysis System has several performance measures to determine effectiveness of production control.

Example: One performance measure is time span between Waiting Shop/In-Shop. This time indicates a delay between the time repair parts are available to the time repairs are actually started. A standard for this work segment is 1 day.

Data, reflecting the time each job spent in this work segment, is collected and analyzed each month to determine the effectiveness of production control in this activity block.

If the data revealed an average 4-day wait between Waiting Shop/In-Shop, the Maintenance Control Section would receive a NO GO for this phase of production control.

The research staff feels that the Work Measurement Analysis System, through its use of performance measures, could effectively compliment the ARTEP as a tool for evaluating unit performance.

The monthly data from the Work Measurement Analysis System could be used as part of an ARTEP evaluation to determine the effectiveness of the unit during an entire year as well as the month in which the ARTEP is conducted.

Currently the ARTEP is conducted in less than one week and occurs only once a year. Under the best circumstances, and with the best ARTEP, it would be difficult to accurately evaluate a unit's effectiveness in this short period of time.

However, by incorporating the Work Measurement Analysis System into an ARTEP, an extremely accurate evaluation of a unit's ability to meet mission requirements could be ascertained. The unit's current performance, performance during the year, and measures taken by the unit to upgrade its effectiveness would be information available to an ARTEP team if this concept was adopted.

SECTION IV

ANALYSIS OF ARTEP AND SOLDIER'S MANUAL INTERFACE

4.0 BACKGROUND

The Army Training and Evaluation Program (ARTEP) was originally designed as an evaluation and training feedback system for combat arms units.

The emphasis of ARTEP is towards successful unit completion of specific missions which are identified as essential to actual success in a combat situation. Each mission is broken down into a number of tasks which are critical to that particular mission. Standards for successful task performance and identification of the elements within a unit which are to perform those tasks are defined by the ARTEP.

The Soldier's Manual, which is designed to evaluate the individual soldier, provides the link between individual and unit performance. The Soldier's Manual defines, by skill level, the critical individual tasks which a soldier must know to effectively contribute to the performance of those unit tasks associated with combat essential missions. The execution of these individual tasks by a soldier is accomplished within a particular duty position.

The Soldier's Manual, through skill qualifications test (SQT), evaluates an individual's ability to perform the critical tasks associated with a particular skill level. The SQT performance measures and test standards are in theory written to be compatible with the ARTEP Standards for successful task performance. Consequently, a soldier who has passed his SQT for a particular skill level should be able to effectively perform

tasks within a duty position which are essential to successful performance of defined ARTEP tasks by a particular unit or element within that unit.

4.1 Methodology

A part of this research effort was to evaluate the accuracy, completeness, and compatibility of the ARTEP and Soldier's Manual as they currently apply to Combat Support and Combat Service Support units. This relationship between the ARTEP and Soldier's Manual is referred to as the ARTEP/Soldier's Manual Interface.

The focus of this evaluation was directed at the Maintenance Control Section and the Automotive Maintenance Section of a Direct Support Company and the 63H MOS which is found in both of those Sections.

The approach taken for evaluating the ARTEP and Soldier's Manual interface was matrix analyses as follows¹:

1. Evaluation of the match-up between ARTEP tasks which apply to the 63H MOS and to the 63H MOS Soldier's Manual tasks.
2. Evaluation of the match-up between the 63H MOS Soldier's Manual tasks to the duty positions occupied by the 63H MOS in the Maintenance Control Section and the Automotive Section of a Direct Support Company.

¹To develop this matrix analysis the research staff utilized the following resources. Refer to Appendix G for excerpts of these documents used.

1. TO&E 29-079H0. Change 12 to identify the duty positions occupied by the 63H MOS.
2. ARTEP 29-79.
3. Soldier's Manuals FM 963H 1/2 - 4.
4. Commander's Manual FM 963H/CM and FM 963B/CM.
5. FM 29-23, TM 38, 750, TM 710-2 and 20 and 34 Series. TMs for wheel and track vehicles.
6. Observation of Maintenance Control Section and Automotive Maintenance Section of 2 Direct Support Companies. One at Fort Knox, KY and the other at Fort Benning, GA.

4.2 Evaluation of ARTEP/Soldier's Manual Administrative Tasks Interface

4.2.1 Evaluation. The research staff rationalized that a good interface between the ARTEP and Soldier's Manual Administrative Task would be indicated by an optimum number of matrix matches (Xs). There are 34 Soldier's Manual Administrative Tasks and a perfect interface would have resulted in 34 matches (Xs). The following criteria were used to determine if a match existed:

1. The Soldier's Manual task had to fall under an ARTEP task.
2. One or more ARTEP task standard(s) had to be applicable to the Soldier's Manual task.
3. The Soldier's Manual task measure had to coincide with the ARTEP task standard.
4. Soldier's Manual tasks/ARTEP tasks had to apply to the 63H MOS.
5. ARTEP task conditions had to be compatible to Soldier's Manual task situations.

4.2.2 Findings. (See Figure 4-7).

Applying the above analysis resulted in only 12 matches between the ARTEP and the Soldier's Manual Administrative Tasks. The ARTEP/Soldier's Manual interface breaks down over the entire game of evaluation criteria. The reasons behind this general breakdown are as follow:

1. A number of Soldier's Manual tasks are not performed by the 63H MOS but rather a 71D or 71L MOS.
2. A number of Soldier's Manual test situations are written for organizational level maintenance activities and not Direct Support.

3. The ARTEP standards are insufficient and do not address the performance measures of a Soldier's Manual task performance.
4. ARTEP standards do not address Soldier's Manual tasks.
5. The ARTEP, in elements where the 63H is located, does not address Soldier's Manual tasks which are specifically combat situational.
6. The ARTEP has an inadequate distribution of tasks among the elements which make up a Direct Support Company.

Of the 22 non-matches, seven Soldier's Manual Tasks (1360, 1361, 3309 and 4317-4320) have no applicable ARTEP tasks for the 63H MOS. An additional seven Soldier's Manual Tasks (1301, 1302, 3306, 3307, 3312, 4315, and 4321) are applicable to ARTEP Tasks 3.1, 3.4, 3.5, 5-15, and 5-16, but these tasks are not associated with elements which have the 63H MOS under the ARTEP Consolidation List. As a result of this ARTEP task distribution, these Soldier's Manual tasks for the 63H MOS are considered not to fall under an ARTEP task. The remaining eight Soldier's Manual tasks (2303, 2304, 3308, 4316, 4323, 2341, 3343, and 3344) fall under an ARTEP task but then break down under one or more of the other applied evaluation criteria.

Illustrative examples of these remaining tasks and one matching task reflect the analysis procedure which the research staff used to apply the evaluation criteria. These examples are shown in Figures 4-1 through 4-5.

o The first example (Figure 4-1) shows a match between an ARTEP task (5-5) and a Soldier's Manual task (3305). The remaining examples

show the exact point(s) where the ARTEP/Soldier's Manual interface link(s) are broken. These four illustration examples are representative of the manner in which the other four tasks also break down.

o Example 2 (Figure 4-2), Soldier's Manual Task 091-63A-3308 Complete TAMMs Forms. This Task falls under ARTEP Task 7.7, Supervise TAMMs and Supply Requirements. Here the ARTEP standard is not applicable to the Soldier's Manual Task. The standard defines supervision while the Soldier's Manual test is one of completing certain forms. Also, the Soldier's Manual measures do not coincide with the ARTEP standards. Again, the ARTEP Standard deals with the Supervisor assuring records are accurate and properly maintained. The Soldier's Manual performance measures test an individual's ability to fill out certain forms. Finally, two of the three forms referenced to in the Soldier's Manual would be filled out by the equipment records clerk (71D) in the organizational maintenance section located in the Company Headquarters.

o Example 3 (Figure 4-3) Soldier's Manual Task 091-634-4316, Prepare Training Program. This task falls under ARTEP Task 6.3. The breakdown of this interface occurs between the Soldier's Manual measures and the ARTEP Standards. They do not coincide because the ARTEP Standards are insufficient. FM 29-23 specifically states that the supervisory 63HS in the Automotive Maintenance Section have training responsibilities. The ARTEP Standards do not address training.

o Example 4 (Figure 4-4) Soldier's Manual Task 091-63A-4329, Implement Work Measurement Techniques. This Task falls under ARTEP Task 5.5. The interface fails to link at two points.

The ARTEP Standard does not apply to the performance test, and, correspondingly, it also does not coincide with the Soldier's Manual Performance measures. The ARTEP Standard in this interface is insufficient. FM 29-23 in detailing production control, stresses the importance of effective manpower utilization and maximum output to mission accomplishment. Measurement technique (tools for time control) are important to successful performance of those tasks.

o Example 5 (Figure 4-5), Soldier's Manual Task 091-63A-3343.

Prepare Request for Issue Using DA Form 2765.

This Soldier's Manual Task falls under ARTEP Task 5.11. The links in this interface are broken at two points: (1) The ARTEP Conditions and Soldier's Manual Test Situation are not compatible; (2) The Soldier's Manual performance measures are not applicable to the 63H MOS.

The ARTEP conditions refer to a Direct Support environment. The Soldier's Manual Test Situation is applicable to an organizational maintenance unit or an element, in a Direct Support Hq. Section. The 63H is not found in either. Both TO&E 29-79 and FM 29-23 indicate that ASL (shop supply) tasks are performed by the 71D MOS and not the 63H MOS.

A summary of this ARTEP Soldier's Manual interface breakdown is provided in Figure 4-6.

4.2.3 Observation

On the basis of this first matrix analysis the following observations were made about the adequacy of this aspect of the ARTEP/Soldier's Manual interface.

1. The ARTEP in its current form appears to be inadequate with respect to its interface with the Soldier's Manual Administrative Tasks. The analysis showed it to be weak in two areas.

- a. Its task standards, in some cases, do not address certain Soldier's Manual Tasks which are supported as mission important tasks by doctrine.
- b. The ARTEP distribution of mission essential tasks among the elements of a Direct Support Company are inadequate. Doctrine emphasizes the importance of quality control in the Automotive Maintenance Section, as well as the Maintenance Control Section (MCS). The ARTEP for example, only addresses that Task in the MCS.

2. The Soldier's Manual listing of Administrative Tasks and associated performance measures does have flaws which prevent an interface with a number of ARTEP tasks.

- a. Most apparent is a number of Soldier's Manual Tasks which are not applicable to the 63H but rather the 76D MOS.
- b. Secondly, a number of Soldier's Manual Administrative Tasks are written for organizational level maintenance activities. Organizational maintenance is not a primary activity for the 63H MOS.

4.3 Evaluation of ARTEP/Soldier's Manual (Technical Tasks) Interface

4.3.1 Evaluation. The Research Staff established two criteria for determining a match between the two documents in the technical tasks area.

1. Inspect and repair tasks had to fall under the appropriate sections.
2. One or more ARTEP task standard(s) had to be similar to the Soldier's Manual performance measures.

4.3.2 Findings. There is a theoretical 100% match between the ARTEP and Soldier's Manual (Technical Tasks) in that both documents address the technical tasks in the appropriate section and set similar performance standards.

4.3.3 Observations. Although there is a complete match between the ARTEP and this portion of the Soldier's Manual, the Research Staff feels that there are a couple of points which demand further investigation.

1. ARTEP Task 6.1, Inspect Equipment, does not address "accuracy and completeness of the inspection" as a standard.

The Research Staff feels this is an important standard that should be associated with this Task.

2. ARTEP Tasks 7.0, Repair Tracked Vehicles, and 8.0, Repair Wheeled Vehicles, have a common critical standard which is not addressed in the Soldier's Manual performance measures.

This standard, "Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards" is applied as a prevailing indicator to technical proficiency of mechanics along with quality and completeness of Repair. The absence of this standard as a performance measure is a shortcoming in the Soldier's Manual.

4.4 Evaluation of Duty Position 63H/Soldier's Manual (Administrative Task) Interface

4.4.1 Evaluation

In order to achieve a match in this evaluation, only one set of criteria had to be met:

1. The Soldier's Manual Administrative Tasks had to be among the Tasks which would be performed within the duty positions occupied by the 63H MOS. The tasks that are performed within these duty positions were identified by (1) actual observation of the operations of the MCS and automotive sections of two Direct Support Companies, and (2) supporting written documentation (FM 29-23, TO&E 29-79, TM 38-750, 710-2).

This evaluation could not take into account compatibility or Soldier's Manual performance measures and performance standards for 63Hs within specific duty positions. Currently performance standards for specific tasks performed within a duty position do not exist.

Whether or not successful completion of Soldier's Manual performance measures would be indicative of successful task performance in a duty position is not known. This evaluation is strictly one of matching a Soldier's Manual task to an appropriate duty position.

4.4.2 Findings (See Figure 4-8)

The analysis resulted in 25 matches more than doubled the number of matches made in the ARTEP Soldier's Manual interface (horizontal matches). The increased number of matches found in the matrix analysis of Duty Position to Soldier's Manual Administrative Tasks supports the Research Staff's observations of the ARTEP's shortcomings. These are: (1) Some

ARTEP standards are not applicable to Soldier's Manual performance test and/or measures. (2) ARTEP tasks are not sufficiently distributed among the elements of a Direct Support Company.

A comparison of the two matrices illustrates these findings. In the first finding: (1) The Soldier's Manual tasks Prepare Training Program (091-63A-4316) and Implement Work Measurement Techniques (091-63A-4323) do not match with the ARTEP. However, in the Duty Position/Soldier's Manual Administrative Task Interface, they do match. Both of these tasks are referred to in Doctrine (FM 29-23) and both are included in the job statements applicable to the appropriate Duty Position. (2) Soldier's Manual tasks 091-63A-3306, Prepare DA Form 2406, Material Readiness Report, 091-63A-3307, Complete Equipment Status Redcon, and 091-63A-3311, Supervise Operator Maintenance, also do not match in the ARTEP/Soldier's Manual Administrative Task Interface. A match does occur in the Duty Position/Soldier's Manual interface. For example, the Automotive Foreman, 63H30, Mobile Maintenance Section, has vehicle operators whom he must supervise. That Soldier's Manual Task falls under ARTEP Task 3.4. However, ARTEP Task 3.4 applies only to the Company Headquarters, as shown in the Consolidated Task List. A number of other findings resulted from the analysis of the Duty Position/Soldier's Manual Administrative Task Interface.

These are: (1) The current Soldier's Manual Administrative Task List by Skill Level is not sufficient for the total number of Duty Positions which exist now by TO&E 29-79. Example:

- a. For the 63H30, Technical Inspector, one cannot find any Soldier's Manual Administrative Task which tests an Inspector's

knowledge of the 2407 as it applies to the inspection or equipment (TM 38-750) (FM 29-23). Also, there are no Soldier's Manual Tasks which define or test the use of the 2404 as an inspection form. Finally, there are no Soldier's Manual procedures which define and test proper inspection procedures (TM 20 series, TM 34 series).

(2) There are a number of Soldier's Manual Administrative Tasks which do not apply to the 63H MOS, but rather to the 76D MOS. This finding is the same as the one evidenced in the evaluation of the ARTEP Soldier's Manual Administrative Task interface.

- a. Completing entries on 2406s, 3318s and 2765s are tasks which are accomplished by the Shop Supply Clerks 76Ds (TO&E 29-79, FM 29-23). These tasks are not performed by the 63H MOS, but are supervised and reviewed by the 63H MOS.

(3) Certain tasks in the Soldier's Manual are either incomplete or worded erroneously so that the task statement does not coincide with the tasks performed within that duty position.

- a. An incomplete task would be Soldier's Manual Task 091-63A-4345. Supervise Maintenance of Shop Service Stock, PLL and ASL. That task is applicable to the Maintenance Control Sergeant 63H40, who is located in the Maintenance Control Section. However, the Maintenance Control Sergeant is responsible for supervising all aspects of shop supply; not just the maintenance of appropriate ASL levels.
- b. Soldier's Manual Task 091-63A-3305, Complete Entries on DA Forms 2405 and 2408-5, are not done by a 63H, but rather a 71L

MOS. A 63H40, Maintenance Control Sergeant, supervises Shop Office operations, which would include assuring an accurate and complete job register is maintained.

(4) There are a number of administrative tasks assigned to a particular skill level which have little or no relevance to the tasks associated with a corresponding duty position.

- a. Soldier's Manual Task 091-63A-2303, Use of DA Pamphlet 310-7, is assigned to a Skill Level 2. This means that a Skill Level 1 must know this task in order to be a Skill Level 2. This task is actually performed on the job by a Skill Level 3, a 63H30 Technical Inspector. As part of his inspection procedures, a T.I. must determine if appropriate MWOs have been applied to a vehicle. A Skill Level 1 or 2 does not make this determination.
- b. Soldier's Manual Task 091-63A-3305, Complete Entries on DA Forms 2405 and 2408-5 is assigned to a Skill Level 3. Again, a Skill Level 2 must learn this task to become a Skill Level 3. In a Direct Support Company, supervision of the Shop Office Clerk (the clerk completes entries on the 2405 and 2408-5) is done by a Skill Level 4, Maintenance Control Sergeant.

4.4.3 Observations

This analysis supported the findings of the ARTEP/Soldier's Manual Administrative Task evaluation with respect to the ARTEP shortcomings in the areas of adequate, complete standards and sufficient tasks distribution. As for the Soldier's Manual, the analysis not only pointed out

the same shortcomings identified in the first evaluation but also surfaced other inadequacies in the current document.

1. The Soldier's Manual Administrative Task Listing is not complete in that it does not address a number of critical tasks which are performed in certain duty positions.

2. The Soldier's Manual distribution of tasks among the skill levels does not totally correspond to the duty positions which need to know those specific tasks. There does not seem to be a "need to know" type distribution.

3. The Soldier's Manual contains both tasks which are not performed by the 63H MOS, as well as ones which are not complete.

These shortcomings in the Soldier's Manual Administrative Task Section raise, in the Research Staff's opinion, questions as to the ability of the document to 1) prepare a soldier in the 63H career field to effectively perform in the duty positions found with a Direct Support unit and 2) be an effective evaluation and career progression instrument.

4.5 Evaluation of Duty Positions 63H/Soldier's Manual Technical Tasks Interface

- 4.5.1 Evaluation Skill Level 1. In order to achieve a match in this evaluation, the technical tasks had to be ones which would be performed at Direct Support level maintenance. The Research Staff used the Maintenance Allocation Charts (MAC) in the 20 Series Technical Manuals to identify which tasks in the Soldier's Manuals were Direct Support level tasks. Tasks which were identified as organizational were researched using the 63B and 63C Commander's Manual to confirm the category of those tasks.

4.5.2 Findings: Skill Level 1. (See Figure 4-9, Sheets 1-3). There are 58 technical tasks pertaining to wheeled vehicles in the 63H Skill Level 1 Soldier's Manual. Out of that number there were 23 matches or 39% of the tasks matched for that skill level, and corresponding duty positions. Thirty-three of those 58 tasks or 57% are organizational level maintenance tasks and all but three are found in the 63B Soldier's Manual. The remaining two tasks are Inspection and Troubleshoot tasks, which are performed by a Skill Level 3, 63H30, Technical Inspector.

Those organizational tasks which are found in both the 63B and 63H Soldier's Manual, are marked by a "B". The other three organization tasks are marked "O".

The matrix shows 14 Technical Tasks under the group title, "Test, Measurement and Diagnostic Equipment." Of these tasks, 13 are organizational level maintenance tasks. As noted in the matrix, all 13 tasks are found in the 63B Skill Level 1/2 Soldier's Manual.

1. Example: The task "Perform a Resistance Test Using a Multimeter," 091-63H-1401 in the 63H Soldier's Manual, is identical in all aspects to the task, "Perform Resistance Test Using a Multimeter," 091-63B-1484 in the 63B Soldier's Manual.

In the other Wheel Category, Repair and Maintenance of Wheel Vehicle Equipment, 20 of the 44 listed tasks were identified as applicable to organizational level maintenance. These tasks are: 1425, 1429, 1432-1434, 1436-1444, 1450, 1451, 1454, and 1458-1460. Seventeen of these 20 tasks are in the 63B Soldier's Manual.

1. Example: The 63B Task 091-63B-1555 and 63H Task 091-63H-1442, Remove and Replace the Air Hydraulic Cylinder on a 2½-ton Truck, are identical. The MAC for the 2½-ton truck indicates the category of maintenance which normally would perform this task is company level organizational maintenance. The reason that a 63H, who is not located at this level, would need to know or perform this task, is unclear.

The Skill Level 1 listing of technical tasks also includes 28 tasks which pertain to Repair of Tracked Vehicles. Of these 28 tasks only eight, or 28%, can be solely associated with Direct Support operations. The remaining 20 tasks are organizational in nature and all are found in the 63C Soldier's Manual. These tasks which are common to both MOS are marked by a "C".

1. Example: The 63H Task 091-63H-1482 and the 63C Task 091-62C-1730, "Remove and Replace Generator Assembly on a M60A1 Tank", are identical. The task by maintenance allocation chart distribution is an organizational task.

The occasion which would necessitate the 63H to perform this task is not certain.

4.5.3 Observations: Skill Level 1. The findings from the Evaluation of the Duty Position/Soldier's Manual Technical Tasks Interface (Skill Level 1) leaves the Research Staff with some unanswered questions.

The Staff recognizes that an overlapping of tasks in the Wheel Vehicle Mechanic's Course (63B0, Track Vehicle Mechanic's Course (63C), and the Auto Repairman's Course (63H) is going to occur. There are obviously some organizational tasks which are going to be an integral part

of a Direct Support level repair task. For example, the Organizational Task, "Adjust Free Travel on a Clutch", would be a part of the Direct Support level task "Install Clutch Assembly."

However, an analysis of the listed tasks against the MAC and a list of tasks performed over a three-month period at two Direct Support Companies, leaves the Research Staff with the feeling that an undetermined number of these organizational tasks are not associated with Direct Support repairs.

The Research Staff feels the following questions need to be addressed in order to provide more definite answers concerning this Duty Position/Soldier's Manual (Skill Level 1) Interface.

1. How many of the organizational tasks (Skill Level 1) found in the 63H Soldier's Manual are actually associated with or are integral to the accomplishment of a Direct Support Repair Task?
2. How many of the organizational tasks are taught just to provide the student with an introduction to automotive repair?
3. If the answer to the above question approaches the total percentage of organizational tasks, then the question arises as to the ability of the student to adequately perform those Direct Support tasks he will encounter at his First Duty Station.
4. TO&E 29-79 assigns 63Bs and 63Cs to the Automotive Section. As the 63B, 63C and 63H courses have a high degree of similarity, the reasons behind the allocation of Bravos and Charlies to the Automotive Section is unclear.

Also, the actual distribution and types of repair tasks among the three MOSs are not known at this time.

Initially, the Research Staff had rationalized that the 63Bs and the 63Cs were assigned to the Automotive Section to perform organizational repairs that might occur as part of Direct Support Repair Tasks. However, the current similarity of tasks among the three MOSs negates this hypothesis.

The questionable assignment of the 63B and 63C MOSs to a Direct Support Company is further complicated by the apparent curtailment of the career progression of these two MOSs in a Direct Support Company's Automotive Section. The 63B and 63C, after reaching a Skill Level 2, cannot be promoted to a Skill Level 3 in the Automotive Section. Currently, there are not any allocations by TO&E for an E-6, Skill Level 3, 63B or 63C in an Automotive Section of a Direct Support Company. However, there are allocations for this Skill Level in the Maintenance Sections of the supported combat battalions.

The question concerning the relationship between the 63B, 63C and 63H is obviously a perplexing one for the Research Staff and one that cannot be satisfactorily answered in this report.

4.5.4 Evaluation: Skill Level 2. The evaluation of the interface between the Duty Position/Soldier's Manual Technical Task Skill Level 2 used the following criteria:

1. The Soldier's Manual technical tasks had to be compatible with the task description of the duty position occupied by a Skill Level 2 as defined by FM 29-23 and TO&E 29-79¹.

¹Research Staff observation and study of the automotive operations of two Direct Support companies found the task descriptions to be the guiding documentation for assigning actual job responsibilities in the field.

2. The technical tasks had to be applicable to Direct Support level repairs.¹ Reference Maintenance Allocation Charts.

4.5.5 Findings: Skill Level 2. (See Figure 4-10, Sheets 1-3). There are 78 technical tasks listed in the 63H Skill Level 2 Soldier's Manual. Of these, 26 are inspect and troubleshoot tasks and 52 are test, repair, and adjust automotive equipment tasks. Out of 78 possible matches, there are only 40 or 51% that match. The matrix analysis for this evaluation is shown on Figure 4-10, Sheets 1-3.

In a Direct Support Company, inspect and troubleshoot tasks are performed by a 63H30 Technical Inspector.² A Skill Level 2 would only troubleshoot in context of a Repair Task. For example, after installing an M113A1 engine, and noticing an oil leak, the Skill Level 2 mechanic would try to determine the cause of the leak. The performance measures for the inspect and troubleshoot tasks are focused on initial diagnosis of an equipment fault, and the extent of work required and not diagnostic procedures during actual repair of an equipment fault.

Also, inspection tasks to determine overall condition of equipment components are totally the responsibility of the 63H30 Technical Inspector.

Evaluation of the other 52 technical tasks result in 40 matches. However, these are only theoretical matches as all Skill Level 2 Direct Support

¹The Research Staff feels that further investigation of the Soldier's Manual technical tasks should require a front-end analysis to determine the commonality of Soldier's Manual Technical Tasks to those performed in the field.

²(Xs) is the matrix analysis, Figure 4-10, Sheet 1, by the 63H30 Technical Inspector indicates a match for this duty position to the inspect and troubleshoot tasks. The absence of a partial match for the Skill Level 2 indicates a gap between the two levels.

tasks are not taught in an automotive course, but rather are categorized as FOJT, which means they should be taught through some type of OJT program at the unit. The degree to which this type of training is being done is not known at this time.

Also, a number of these tasks have been revealed to be applicable to General Support and Depot job requirements and are not applicable to Direct Support Activities.¹ Examples are:

1. 091-63H-2561, Test Piston Wear Limits
2. 091-63H-2576, Perform Cam Lobe Lift Test on Cam Shaft in Vehicle Engine.
3. 091-63H-2578, Measure Gear Backlash
4. 091-63H-2581, Test Flywheel Run-out
5. 091-63H-2582, Measure Cylinder Sleeve Base on 8V71T Engine.

The remaining tasks are organizational and their applicability to Direct Support repairs is not certain. These tasks are marked by the following symbols:

1. (B) Task is found in the 63B Soldier's Manual
2. (C) Task is found in the 63C Soldier's Manual
3. () Task is organizational by MAC definition; NOT found in the 63B or 63C Manual.

4.5.6 Observations: Skill Level 2. The analysis of the interface between the Duty Position and the Skill Level 2 Technical Tasks, like the analysis of the Skill Level 1 interface, raised a number of questions which the Research Staff cannot satisfactorily answer without a front-end analysis.

¹Interview with mechanics at Skill Levels 2 and 3 reveal that these tasks are not performed in a Direct Support unit. Manual references indicate that these tasks can be performed at General Support and at Depot.

1. As Skill Level 2 mechanics do not have the opportunity to perform troubleshoot and inspection tasks, the Research Staff has to question:

- a. the ability of Skill Levels 1 and 2 to actually perform those tasks.
- b. the appropriateness of those tasks in the Soldier's Manual as a requirement for Skill Levels 1 and 2. As the task is performed by a Skill Level 3, it would seem appropriate to assign those tasks to that Skill Level.

2. The fact that the entire task listing for Skill Level 2 is designated as OJT, places a tremendous responsibility on a Direct Support organization to have an effective training program. This means trainers, training materials, a means to identify training needs, and a training model.

Based on observations of two Direct Support Companies, the Research Staff tentatively feels that most Direct Support units would have great difficulty meeting this training requirement. A number of reasons contribute to this tentative conclusion.

1. Both units observed were far short of the number of authorized senior enlisted personnel by TO&E. These senior personnel are assigned training responsibilities by doctrine.
2. Both units exceeded their authorized strength in Skill Levels 1 and 2 personnel which magnifies the training requirement.
3. Training materials such as Direct Support level TEC lessons were not available to either unit.
4. Absence of a structured or formalized training program.

Impediments to unit training requirements as cited above cause some skepticism on the part of the Research Staff as to the ability of the Direct Support unit to initiate a formal OJT program as is currently required by the present Soldier's Manual task listing.

The Soldier's Manual states that a soldier, in order to progress from a current skill level to the next higher level, must pass a Skill Qualification Test (SQT). Two-thirds to three-quarters of this test are composed of tasks which a soldier should know at his current skill level. The other one-fourth to one-third of the test contains tasks at the next higher skill level, which the soldier must know to successfully progress to that skill level.

Applying this criteria to Skill Levels 1 and 2, it is easy to discern the significance of a unit training program to a soldier's career progression.

If the Research Staff's tentative conclusion is accurate, there exists an urgent need to coordinate the Soldier's Manual prerequisites of career advancement with the Direct Support unit's training capabilities.

4.5.7 Evaluation: Skill Level 3. One set of criteria had to be met for a match between duty positions and Soldier's Manual technical tasks Skill Level 3 to occur.

1. The Soldier's Manual tasks for this Skill Level had to be the same as those identified by FM 29-23 and T&E 29-079 for the Duty Positions occupied by the 63H30.

The 63H30 is found in two duty positions in a Direct Support Company. One duty position is the Technical Inspector-T&E authorizes two technical inspectors for inspection of automotive equipment in the Maintenance Control Section.

The other duty position is that of Automotive Repair Foreman of a mobile maintenance team. There are three such positions in a Direct Support Company.

The matrix analysis for this evaluation is shown on Figure 4-11.

4.5.8 Findings: Skill Level 3. (See Figure 4-11). In the 63H Skill Level 3 Soldier's Manual there are 11 supervisory tasks under the title, "Supervision of Automotive Repairmen." For the duty position, Automotive Repair Foreman, there is a complete match to these tasks. However, for the duty position of Technical Inspector, there is not a match. The 63H Skill Level 3 Soldier's Manual is completely incompatible with this duty position, as all inspection and troubleshoot tasks in the Soldier's Manual are found at Skill Level 2.

This total mismatch between the Soldier's Manual and duty position of Technical Inspector raises a multitude of questions, as well as reinforcing the fact that the current Soldier's Manual has a number of problems which demand closer scrutiny. These problems are:

1. The 63H30, Technical Inspector, who inspects and troubleshoots equipment faults on a daily basis, is not tested on his ability to diagnose equipment faults and accurately determine extent of repair and parts needed.
2. A 63H20 is now tested on inspect and troubleshoot tasks which he currently has no practical work in with the exception of fault diagnosis during equipment repair. The performance measures for these troubleshoot tasks are applicable only to initial fault diagnosis.

3. The performance measures and test standards for troubleshooting tasks are the same for the 63B, 63C and the 63H MOSs. The Research Staff, working within the scope of this effort, was not able to determine if a difference in level of troubleshooting exists between these MOSs.

Example: 63B Soldier's Manual Task 091-63B-1518 and 63H Soldier's Manual Task 63H 091-63H-2527 are both "Troubleshoot Clutch on Wheeled Vehicles" with identical performance measures and test standards.

This situation is acceptable if there is a difference in the level of troubleshooting between the 63B, 63C and 63H. The 63H has to both verify the organizational level diagnosis and initiate his own troubleshooting and fault diagnostic procedures to precisely pinpoint the equipment failure and parts needed to repair that failure. There are several factors which a technical inspector must consider at his level of troubleshooting.

1. The organizational diagnosis may be wrong and the equipment fault is repairable at organizational level, e.g., organization diagnosis is defective M113A1 engine. Equipment failure is actually a starter which is replaced by organizational maintenance.
2. The organizational level diagnosis of the fault may be incorrect and while the equipment failure may be a Direct Support Repair task, the fault is other than the one diagnosed, e.g., organizational diagnosis is defective engine. Actual failure is the transmission.

3. The organizational level diagnosis is correct.
4. The extent of the repair needed is greater than indicated by the organization failure diagnosis, e.g., organizational diagnosis is engine failure. In fact, it is the engine and the transfer.
5. The organizational diagnosis may be only a description of the failure, e.g., engine knocking. The Technical Inspector would have to determine if part(s) or an engine is needed to complete the repair.

A working example is provided below to more clearly demonstrate the difference between organizational (63B and 63C) Skill Level 1 Troubleshooting and that found at Direct Support Maintenance (63H) Skill Level 3.

Example: M113A1 engine fails to crank when starter switch is held on.

The 20 Series TM for a M113A1, TM 2300-257-20 lists several reasons this failure could occur.

1. Malfunction in starter or battery system.
2. Mechanical seizure of the engine.
3. Mechanical seizure of transfer gear case or transmission.
4. Starter drive pinion not engaging with flywheel ring gear.

Organizational maintenance is authorized to replace a part(s) causing failures 1 and 4. Consequently, organizational maintenance would have to troubleshoot (inspect and test) those particular possibilities to determine if one or both are the causes for the engine not turning over.

After taking proper steps to eliminate the cause of the failure at their level, organizational maintenance would send the vehicle to Direct Support.

The Technical Inspector would perform the following troubleshooting procedures.

1. Hewould verify organizational troubleshooting.
2. He would disengage engine disconnect and turn engine by hand.
3. If engine did not turn over, the Technical Inspector would troubleshoot engine. TM 2815-205-34.
4. If engine turned over, Technical Inspector would troubleshoot transfer. TM 2520-236-34.
5. If engine and transfer gear case did not work, the Technical Inspector would troubleshoot the transmission.

4.5.9 Observations. The findings from the Evaluation of the Duty Position/Soldier's Manual Technical Tasks Interface (Skill Level 3) adds to growing list of evidence that the Soldier's Manual as it currently exists, cannot be an effective document for evaluation of individual soldier proficiency and career progression.

Again, there are a number of questions which need answers.

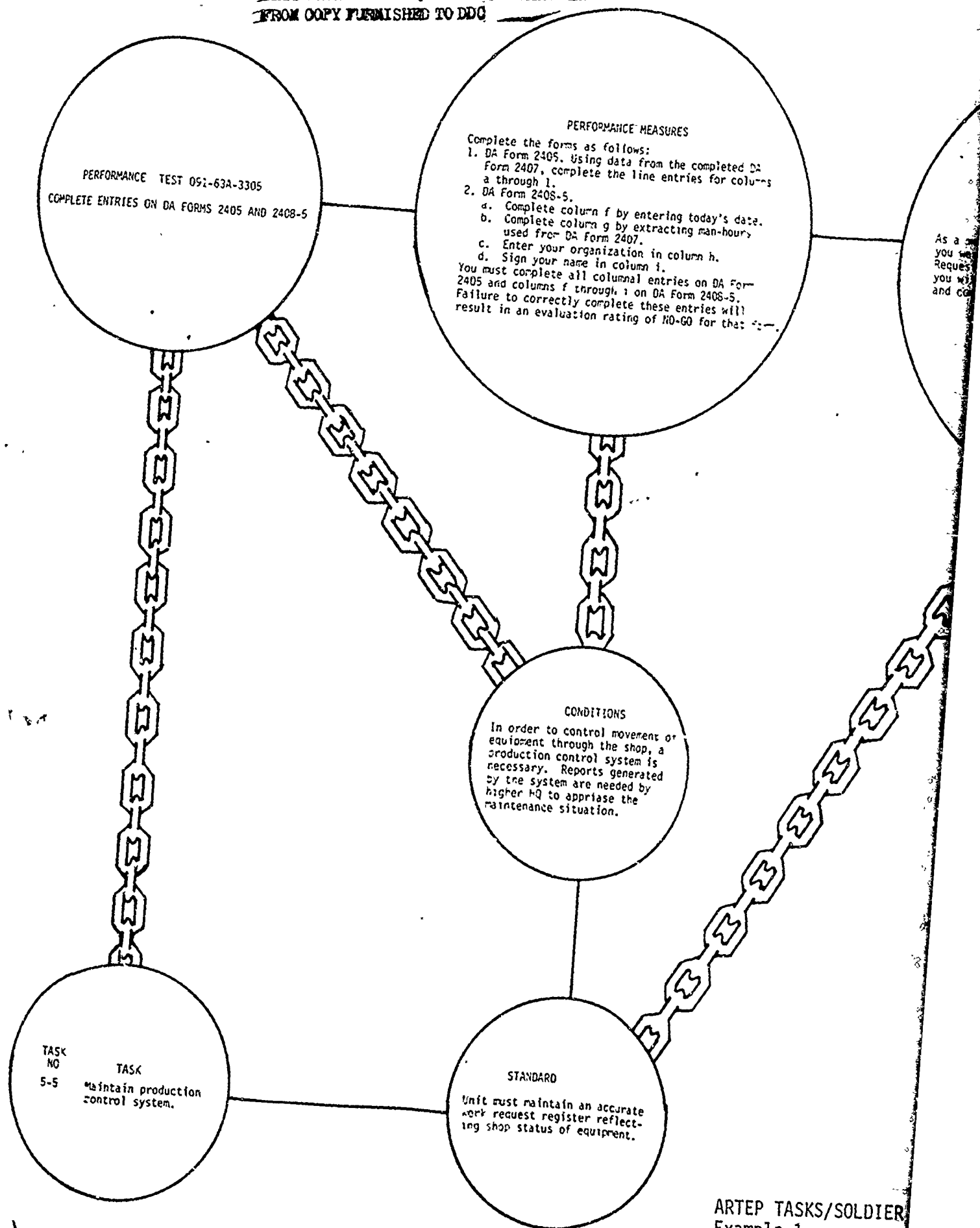
1. As the Skill Level 2 does not perform inspect and troubleshoot tasks, all of which are OJT, how can this Skill Level be expected to know these tasks?
2. Why does the Soldier's Manual not address the Duty Position 63H30? This position, in the Research Staff's opinion, is one of the most critical.
 - a. Erroneous diagnostic decisions could result in a high dollar waste.
 - b. Incorrect diagnosis will extend the downtime of vehicles as additional parts will be required.

- c. This situation can create a backlog which will increase the downtime for other combat vehicles at Direct Support.
 - d. Inadequate inspections can result in ineffective organizational maintenance as well as diminish quality control for the Automotive Section.
3. It is not clear where a 63H30 obtains the necessary experience to accurately troubleshoot and determine extent of repairs and needed parts.
- a. There is not a standard or required course Army-wide, for Technical Inspector.

Currently, a 63H20 would gain experience only if a shortage of authorized 63H30s allowed him/her to occupy a technical inspector duty position.¹

¹At Fort Knox, the General Support Facility conducted an informal course for Technical Inspectors. Technical Representatives at that facility stated that very few Technical Inspectors have the necessary experience to obtain troubleshooting proficiency and that some type of troubleshooting course was absolutely necessary. Also, interviews with Technical Inspectors revealed, for those who had attended, that the Fuel and Electric Course had improved their ability to troubleshoot automotive equipment.

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PERFORMANCE MEASURES

Complete the forms as follows:

1. DA Form 2405. Using data from the completed DA Form 2407, complete the line entries for columns a through i.
 2. DA Form 2408-5.
 - a. Complete column f by entering today's date.
 - b. Complete column g by extracting man-hours used from DA Form 2407.
 - c. Enter your organization in column h.
 - d. Sign your name in column i.
- You must complete all columnal entries on DA Form 2405 and columns f through i on DA Form 2408-5. Failure to correctly complete these entries will result in an evaluation rating of NO-GO for that task.

TEST SITUATION

As a member of Company A, 32nd Maintenance Battalion (DS), you were working in the shop office and receive a Maintenance Request, DA Form 2407. Using the completed DA Form 2407, you will be tested on your ability to prepare DA Form 2405, and complete DA Form 2408-5.

CONDITIONS

In order to control movement of equipment through the shop, a production control system is necessary. Reports generated by the system are needed by higher HQ to appraise the maintenance situation.

STANDARD

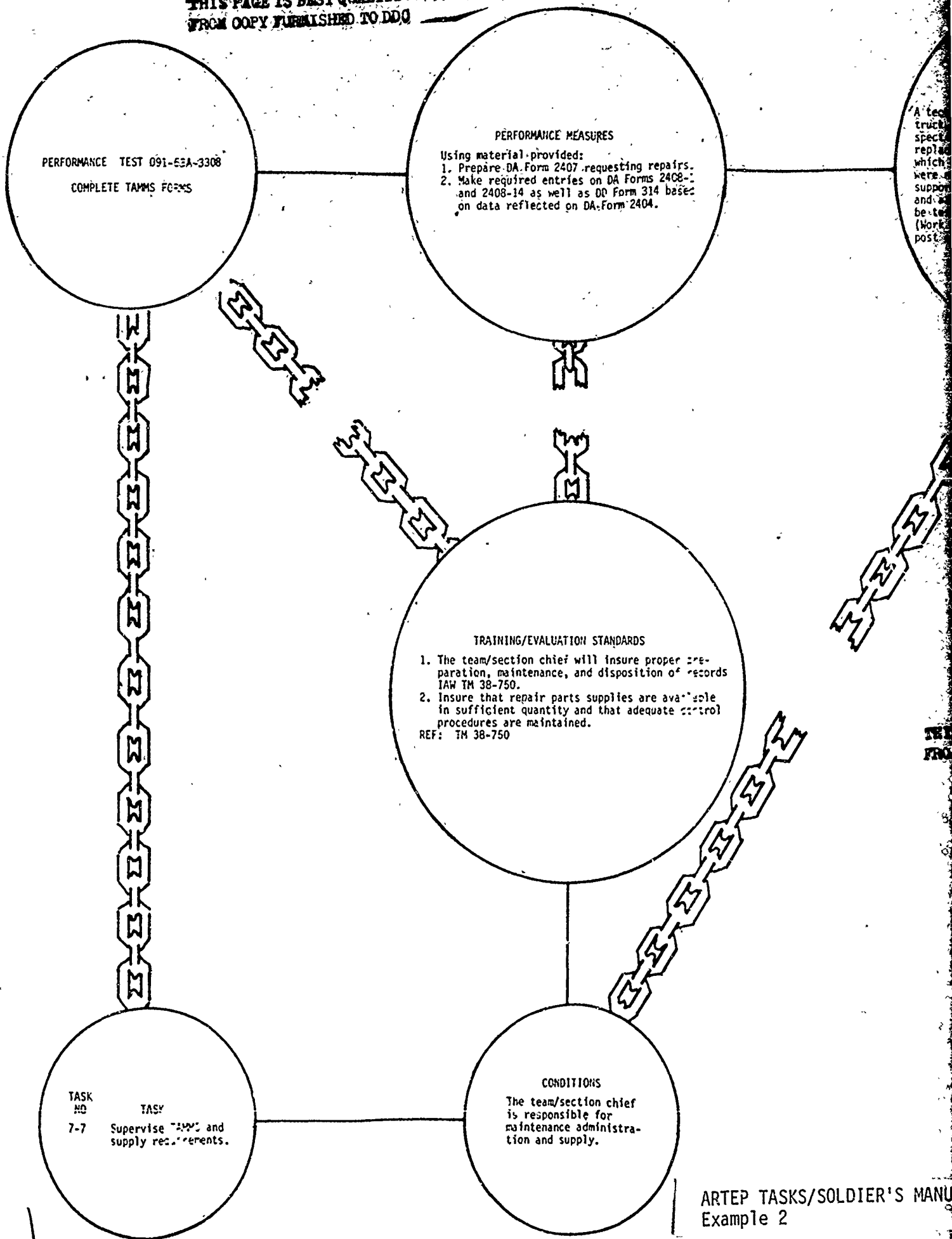
Unit must maintain an accurate work request register reflecting shop status of equipment.

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FIG. 4-1

ARTEP TASKS/SOLDIER'S MANUAL TASKS INTERFACE,
 Example 1

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PERFORMANCE MEASURES

Using material provided:

1. Prepare DA Form 2407 requesting repairs.
2. Make required entries on DA Forms 2408-1 and 2408-14 as well as DD Form 314 based on data reflected on DA Form 2404.

TEST SITUATION

A technical inspection has been conducted on a truck, utility, M151. As the result of the inspection, items were adjusted, tightened, and replaced; some repair parts had to be requested, which classified as shortcomings; and deficiencies were noted which required repair by your direct support unit. Using the completed DA Form 2404 and additional information to be provided, you will be tested on your ability to prepare a DA Form 2407 (Work Request), post entries to DA Form 2408-1, post entries on DA Form 2408-14, and post DD Form 314.

TRAINING/EVALUATION STANDARDS

1. The team/section chief will insure proper preparation, maintenance, and disposition of records IAW TM 38-750.
 2. Insure that repair parts supplies are available in sufficient quantity and that adequate control procedures are maintained.
- REF: TM 33-750

CONDITIONS

The team/section chief is responsible for maintenance administration and supply.

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FIG. 4-2

ARTEP TASKS/SOLDIER'S MANUAL TASKS INTERFACE,
Example 2

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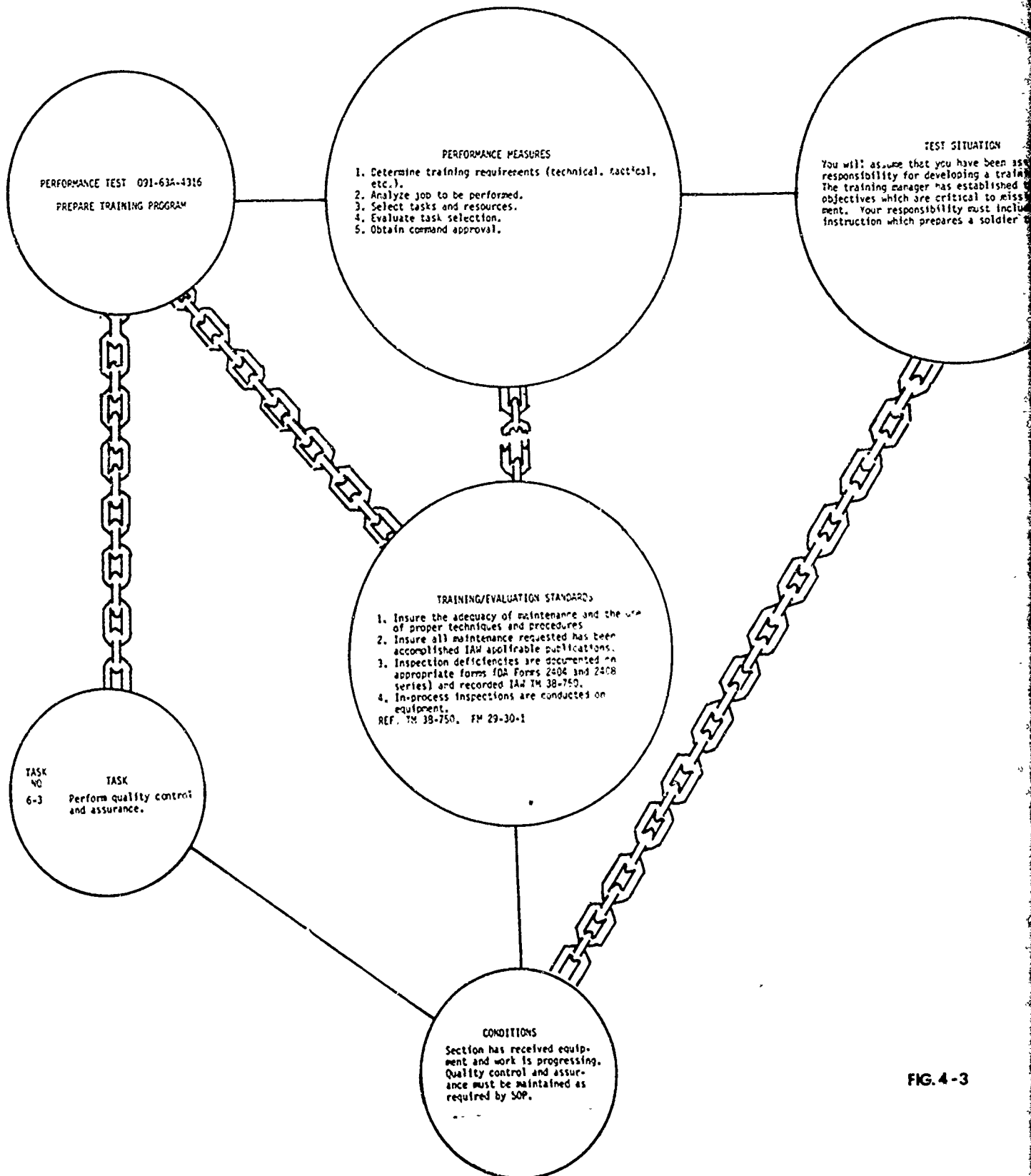


FIG. 4-3

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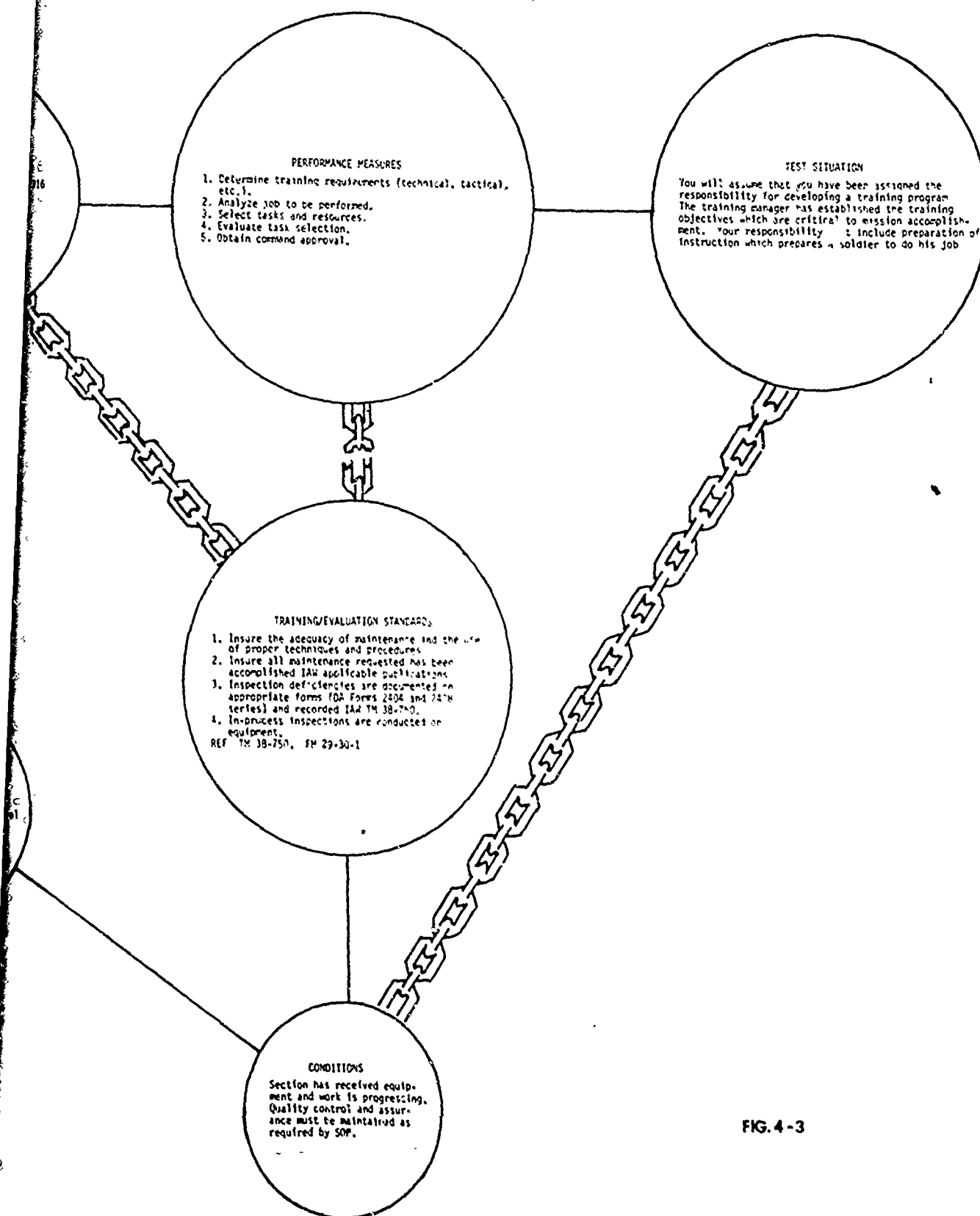


FIG. 4-3

ARTEP TASKS/SOLDIER'S MANUAL TASKS INTERFACE,
Example 3

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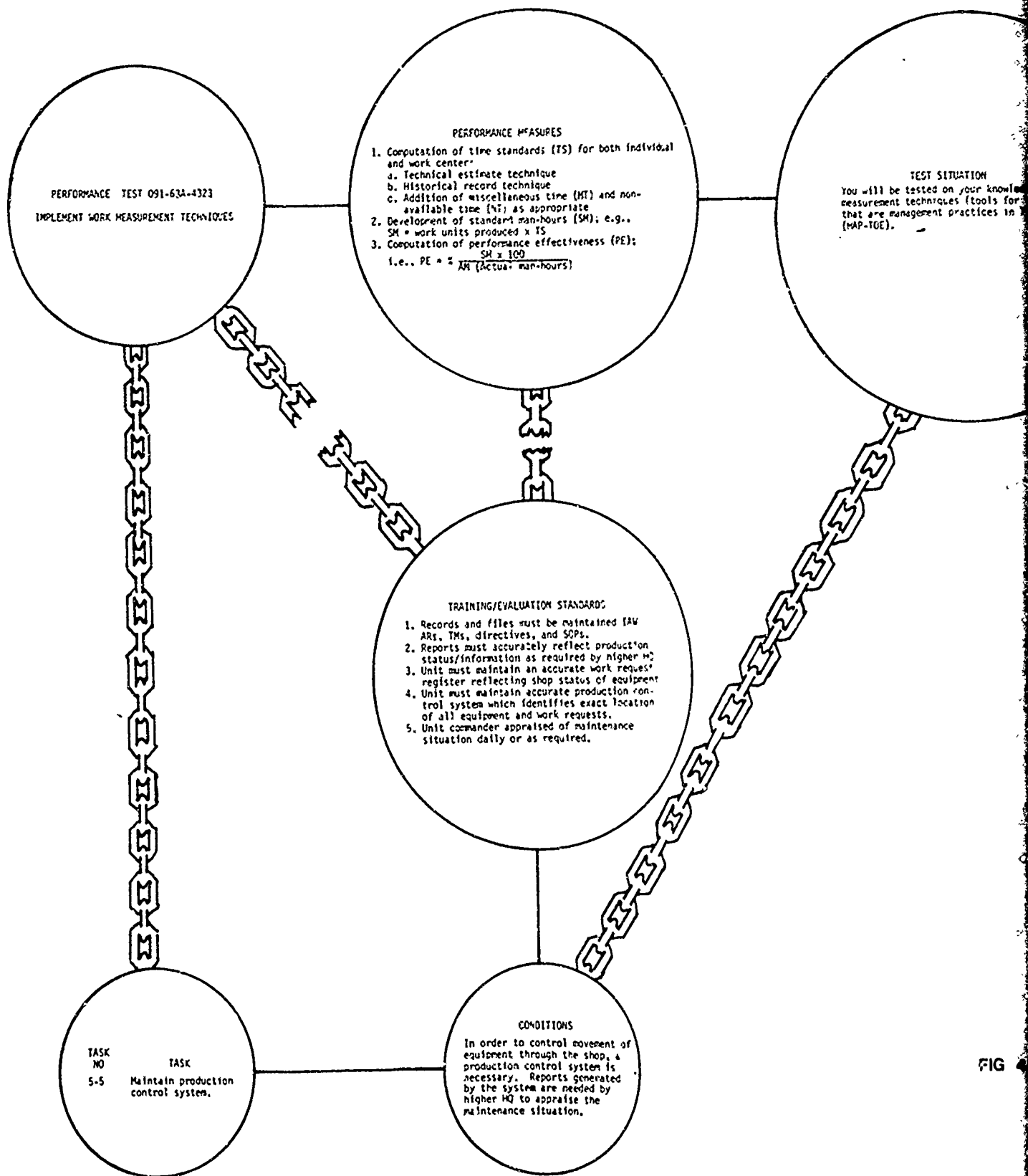


FIG 4

ARTEP TASKS/SOLDIER'S MANUAL TASKS INTERFA3
Example 4

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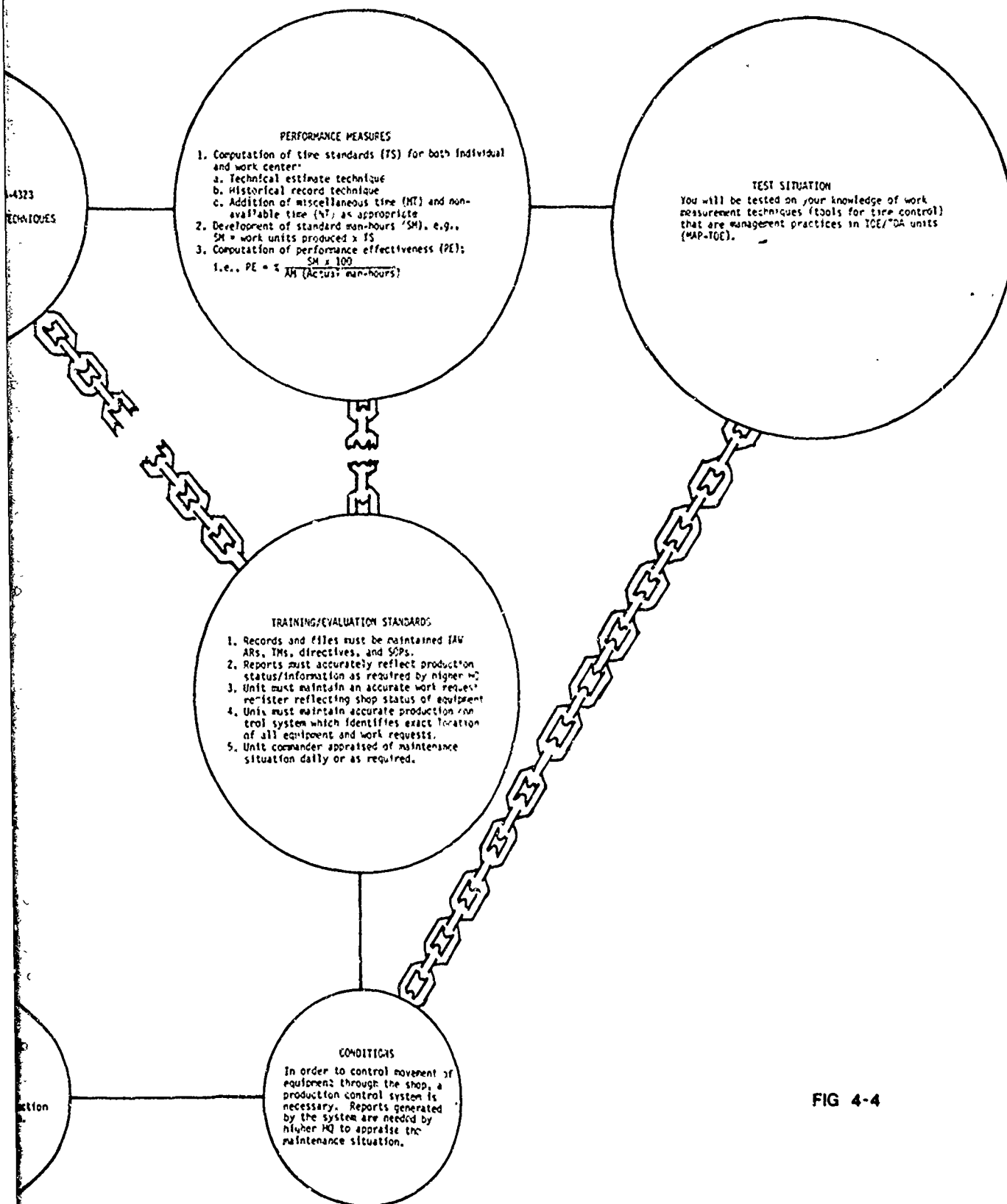
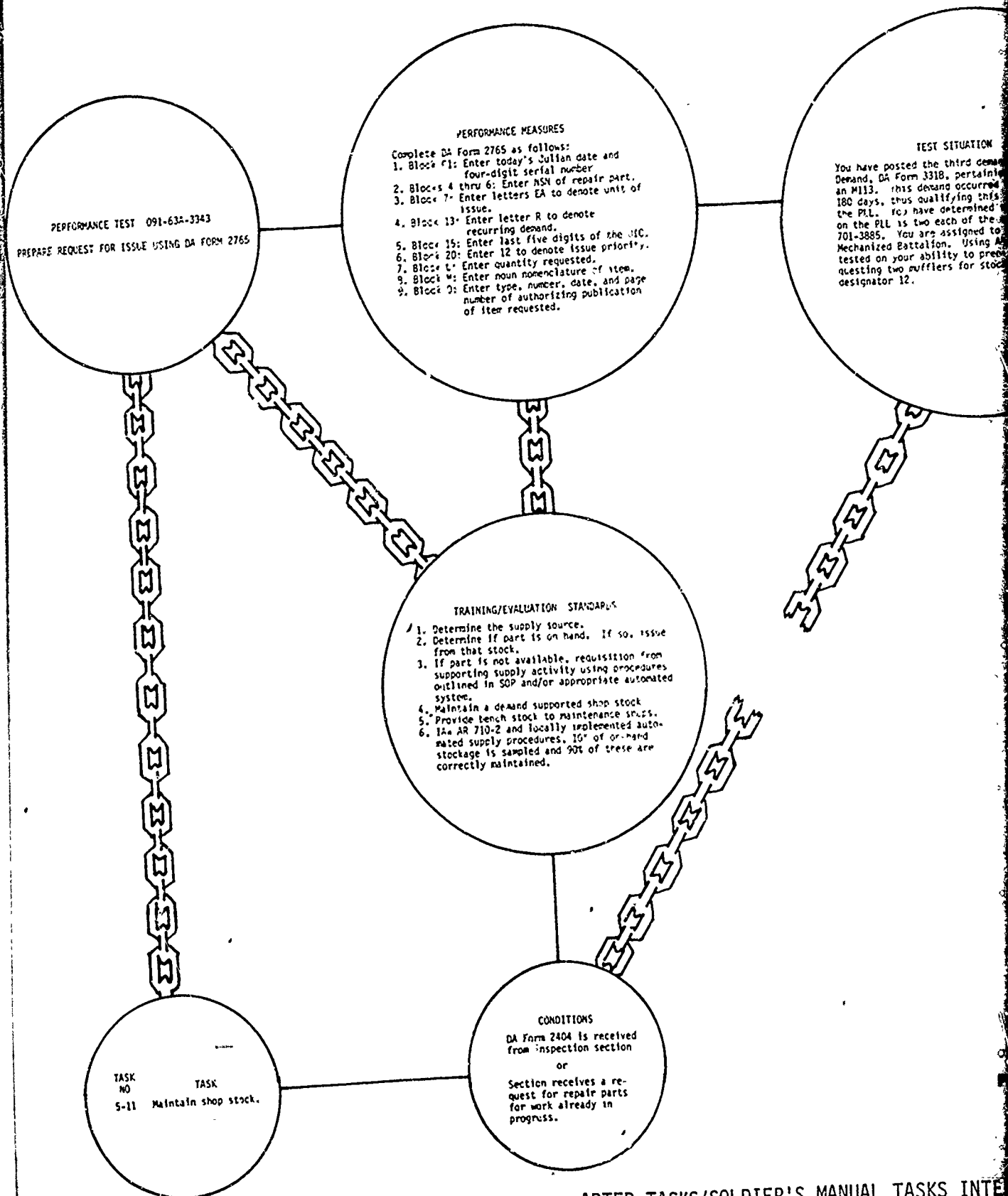


FIG 4-4

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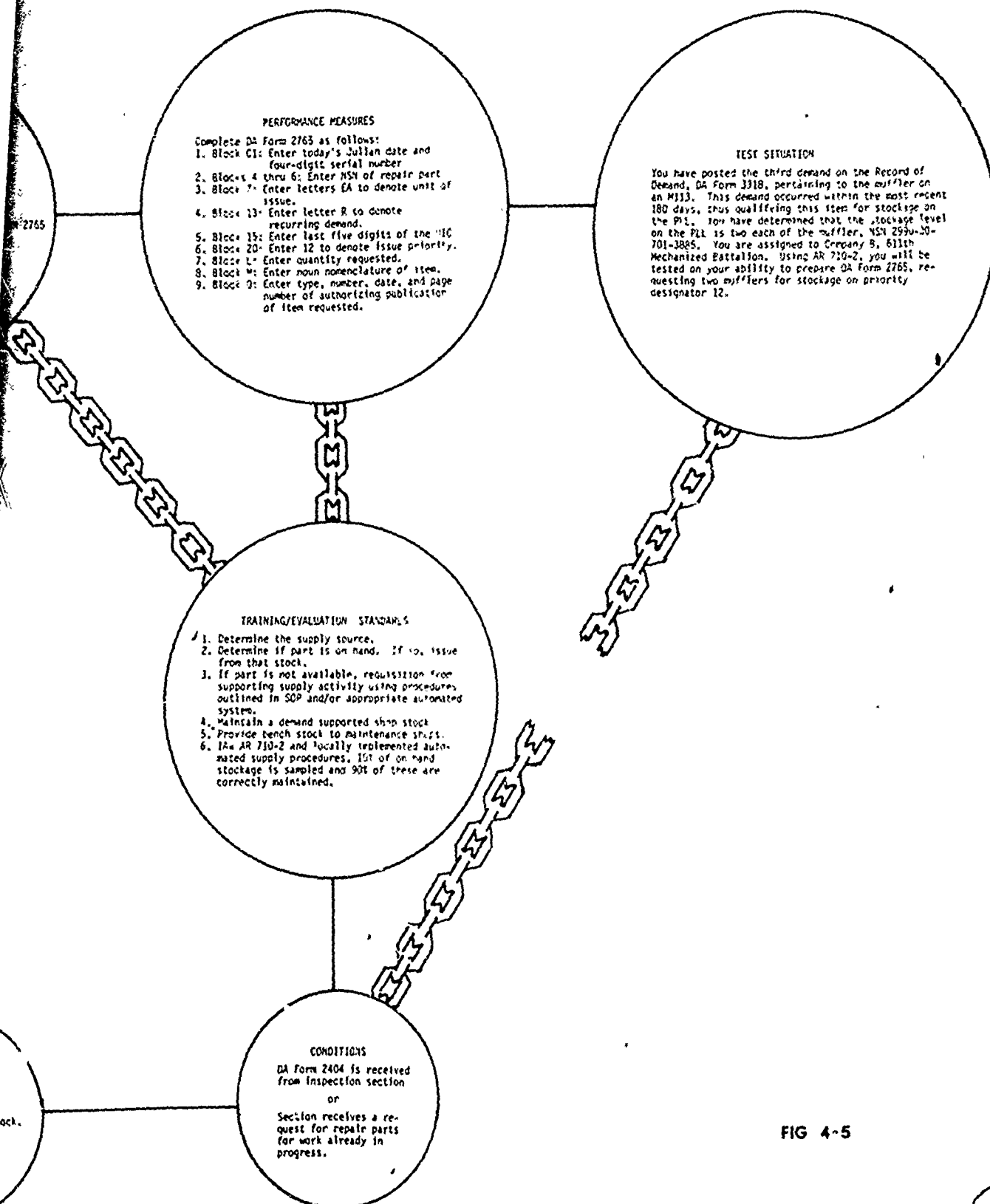


FIG 4-5

Evaluation Criteria	Soldiers Manual Administrative Task					
	Soldiers Manual Task Falls under ARTEP Task	1 or more ARTEP Task standards applicable to Soldiers Manual Task	The Soldiers Manual measure coincides with the ARTEP Task Standard	Soldiers Manual measure Apply to the ARTEP Task	ARTEP Manual/ARTEP Tasks Apply to the 63H MOS	ARTEP Conditions compatible to Soldiers Manual Test Situations
Complete TAMMS Forms	X			X		
Prepare Training Program	X	X		X	X	
Implement Work Meas. Techniques	X			X	X	
Prepare 2765	X	X	X			

X indicates a match in interface

Figure 4-6

SOLDIERS MANUAL ADMINISTRATIVE TASKS BY SKILL LEVEL 63H MJS ARTEP TASKS		LOGISTICAL MANAGEMENT																			
		1303	1301	1302	2303	2304	3305	3306	3307	3308	3309	3310	3311	3312	4313	4314	4315	4316	4317	4318	4319
SKILL LEVEL		1	1	1	2	2	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4
5 MAINTAIN PRODUCTION CONTROL SYSTEM																					
5-5	Maintain Production Control System						X														
5-8	Maintain Liaison with Supported and Supporting Units											X									
5-9	Dispatch On-Site Maintenance and Recovery/Evacuation Teams																				
5-11	Maintain Shop Stock																				
5-17	Request EOD Support																				
5-18	Request NRC Support																				
6 MAINTAIN QUALITY ASSURANCE AND CONTROL																					
6-1	Inspect Equipment																				
6-3	Perform Quality Control and Assurance																				
6-4	Maintain a Publications Library																				
7 MAINTAIN PLATOON/SECTION CONTROL																					
7-1	Maintain Shop Safety Programs and Procedures																				
7-2	Submit Workload Status by Section																				
7-4	Maintain Tools and Equipment Accountability																				
7-5	Maintain Communications with Maintenance Control Section																				
7-7	Supervise TAPMS and Supply Requirements																				
8 PROVIDE MAINTENANCE SUPPORT SERVICES																					
8-5	Repair Tracked Vehicles																				
8-6	Repair Wheeled Vehicles																				
8-7	Repair Fuel and Electric Equipment																				

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LOGISTICAL MANAGEMENT																
SOLDIERS MANUAL ADMINISTRATIVE TASKS BY SKILL LEVEL 63H MOS Duty Positions by TO&E	1300	1301	1302	2303	2304	3305	3306	3307	3308	3309	3310	3311	3312	4313	4314	4315
	Use Department of the Army (DA) Pamphlet 310-4	Prepare TAMS Forms Used by Vehicle Operator	Perform Equipment Serviceability Criteria (ESC)	Use DA Pamphlet 310-7	Describe Types of Modification Work Orders (MWO)	Complete Entries on DA Forms 2405 and 2405-5	Prepare DA Form 2406, Material Readiness Report	Compute Equipment Status RECON	Complete TAMS Forms	Describe the Categories and Functions of Maintenance	Describe the Need for Tool Control and Accounting Procedures	Describe Methods of Providing Technical Assistance	Supervise Operator Maintenance	Implement a Shop Safety Program	Maintain Reference Library	Prepare Standing Operating Procedures (SOP)
	1	1	1	2	2	3	3	3	3	3	3	3	3	4	4	4
	MAINTENANCE CONT SEC															
	63H40: Maint Cont SGT E7						X	X				X				X
	63H30: Technical Inspect E6	X		X	X							X			X	
	NECH MAINT PLT															
	63H40: Plt SGT E7															
	AUTO MAINT SEC															
	63H40: Sec Chief E7	X									X			X	X	X
	63H40: Auto Rpmn Foreman E7	X									X			X	X	X
	63H20: Auto Rpmn E5															
	63H10: Auto Rpmn E4		X	X												
	63H10: Auto Rpmn E3		X	X												
	MOBILE MAINT SEC															
	63H30: Auto Rpmn Foreman E6							X				X				

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																SUPPLY
3302	Describe the Categories and Functions of Maintenance	3														
3310	Describe the Need for Tool Control and Accounting Procedures	3														
3311	Describe Methods of Providing Technical Assistance	3														
3312	Supervise Operator Maintenance	3														
4313	Implement a Shop Safety Program	4														
4314	Maintain Reference Library	4														
4315	Prepare Standing Operating Procedures (SOP)	4														
4316	Prepare Training Program	4														
4317	Utilize Operations Order	4														
4318	Plan Convoy of Unit Vehicles	4														
4319	Prepare Operations Plan	4														
4320	Establish Field Site Layout	4														
4321	Review Completed DA Form 2406	4														
4322	Supervise Maintenance of a Functional File System	4														
4323	Implement Work Measurement Techniques	4														
4324	Supervise Recover Operations	4														
4325	Supervise and/or Coordinate with Production Control Operations	4														
1340	Locate and Record National Stock Number (NSN) for a Repair Part	1														
2341	Complete Entries on Document Register for Supply Action (DA Form 2064) and on Record of Demands (DA Form 3315)	2														
3342	Inventory Assigned Property	3														
3343	Prepare Request for Issue Using DA Form 2765	3														
3344	Compute Stockage Level of Prescribed Load List (PLL)	3														

COMBAT RELATED

FIG. 4-8

DUTY POSITIONS/SOLDIER'S MANUAL TASKS (ADMINISTRATIVE INTERFACE)

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										SUPPLY					MAINTENANCE	
4317	Utilize Operations Order	4														
4318	Plan Convoy of Unit Vehicles	4														
4319	Prepare Operations Plan	4														
4320	Establish Field Site Layout	4														
4321	Review Completed DA Form 2406	4														
4322	Supervise Maintenance of a Functional File System	4														
4323	Implement Work Measurement Techniques	4														
4324	Supervise Recover Operations	4														
4325	Supervise and/or Coordinate with Production Control Operations	4														
1340	Locate and Record National Stock Number (NSN) for a Repair Part	1														
2341	Complete Entries on Document Register for Supply Action (DA Form 2064) and on Record of Demands (DA Form 3318)	2														
3342	Inventory Assigned Property	3														
3343	Prepare Request for Issue Using DA Form 2765	3														
3344	Compute Stockage Level of Prescribed Load List (PLL)	3														
4345	Supervise Maintenance of Shop/Service Stock, PLL, and ASL	4														
1360	Maintain Assigned Tool Kit/Set	1														
1361	Maintain Individual Clothing and Equipment	1														

SOLDIER MANUAL TASKS VERSUS DUTY POSITIONS

COMBAT RELATED

FIG. 4-8
DUTY POSITIONS/SOLDIER'S MANUAL TASKS (ADMINISTRATIVE)
INTERFACE

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DUTY POSITIONS/SOLDIER'S MANUAL T
TECHNICAL) INTERFACE

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REPAIR AND MAINTENANCE OF WHEELED VEHICLES														
1413	Perform Compression Test on Vehicle Engine													
1414	Perform Manifold Vacuum Test on Carbureted Engine	1												
1425	Remove and Replace Generator or Alternator on Wheeled Vehicles	1												
1426	Prepare for Removal of Wheeled Vehicle Powerpack	1												
1427	Install Wheeled Vehicle Powerpack	1												
1428	Replace Engine on Wheeled Vehicle	1												
1429	Repair Defective Wire in Vehicle Wiring Harness	1												
1430	Troubleshoot Systems or Components on M151 1/4-Ton Truck	1												
1431	Remove and Replace Defective Cylinder Head Gasket on the M151 1/4-Ton Truck	1												
1432	Adjust Clutch Linkage on M151 1/4-Ton Truck	1												
1433	Adjust Choke, Throttle, and Accelerator Controls on M151 1/4-Ton Truck	1												
1434	Adjust Idle and Idle Mixture on Carburetor of M151 1/4-Ton Truck	1												
1435	Perform Technical Inspection on M151 1/4-Ton Truck	1												
1436	Adjust and Bleed Service Brakes on M561 1-1/4-Ton Truck	1												
1437	Remove and Replace Service Brake Assembly on M561 1-1/4-Ton Truck	1												
1438	Adjust Parking Brake Handle and Linkage on M561 1-1/4-Ton Truck	1												
1439	Remove and Replace Parking Brake Drum and Shoes on M561 1-1/4-Ton Truck	1												

FIG. 4-9

DUTY POSITIONS/SOLDIER'S MANUAL TASKS (SKILL LEVEL 1
TECHNICAL) INTERFACE

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M520 8-Ton Truck														
1451	Remove and Replace Radiator on M35A2 2-1/2-Ton Truck	1												
1452	Remove and Replace Swing Motor on M316 5-Ton Wrecker	1												
1453	Remove and Replace Crane Turntable Pump Assembly on M816 5-Ton Wrecker	1												
1454	Remove and Replace Power Steering Cylinder on M809 5-Ton Truck	1												
1455	Remove and Replace Power Steering Pump on M809 5-Ton Truck	1												
1456	Remove and Replace Steering Assembly on M809 5-Ton Truck	1												
1457	Remove and Install Lower Steering Column on M520 8-Ton Truck	1												
1458	Remove and Replace Torque Rod on M809 5-Ton Truck	1												
1459	Remove and Replace Rear Spring Assembly on M809 5-Ton Truck	1												
1460	Remove and Replace Front Spring and Shackles on M809 5-Ton Truck	1												
1461	Remove and Replace Rear Axle Assembly on M809 5-Ton Truck	1												
1462	Remove and Replace Fuel Supply Pump on Cummins M16-250 Diesel Engine	1												
1463	Remove and Replace Brake Chamber and Make Slack Adjustment on M553 8-Ton Truck	1												
1464	Remove and Replace Transfer Pump on M520 8-Ton Truck	1												
1465	Remove and Replace Secondary Fuel Filter on M520 8-Ton Truck	1												
1466	Remove, Service, and Install Primary Fuel Filter on M520 8-Ton Truck	1												
1467	Remove M520 8-Ton Truck Steering Gear and Column	1												
1468	Install M520 8-Ton Truck Steering Gear and Column	1												

FIG. 4-9 SH. 2

DUTY POSITIONS/SOLDIER'S MANUAL TASKS (SKILL LEVEL 1 68j)
TECHNICAL) INTERFACE

2

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SOLDIER'S MANUAL TECHNICAL TASKS BY SKILL LEVEL 63H MOS	REPAIR AND MAINTENANCE OF MEDIUM TANKS													
	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1501
DUTY POSITIONS BY TO&E	Remove M60A1 Tank Powerpack	Install M60A1 Tank Powerpack	Replace M60A1 Tank Engine	Remove and Replace Generator Assembly on M60A1 Tank	Remove and Replace Starter from M60A1 Powerpack	Remove and Replace Fuel Injector Nozzles from Powerpack of M60A1 Tank	Remove Fuel Injector from M60A1 Tank Powerpack	Install and Time Fuel Injector Pump on M60A1 Tank Engine	Remove and Install Engine Shroud and Cooling Fans on M60A1 Tank Engine	Replace M60A1 Tank Transmission	Perform Brake Band Adjustment on M60A1 Tank Transmission	Remove and Replace Road Wheel Arm Assembly on M60A1 Tank	Remove and Install Drive Sprockets on M60A1 Tank	Remove M113A1 Carrier Powerpack
SKILL LEVEL	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MAINTENANCE CONTROL SECTION														
63H40: Maintenance Control SGT E7														
63H30: Technical Inspector E6														
MECHANICAL MAINTENANCE PLATOON														
63H40: Platoon SGT E7														
AUTOMOTIVE MAINTENANCE SECTION														
63H40: Section Chief E7														
63H40: Automotive Repairman Foreman E7														
63H20: Automotive Repairman E5														
63H10: Automotive Repairman E4	(C)	(C)	X	(C)	(C)	X	X	X	(C)	X	(C)	(C)	(C)	(C)
63H10: Automotive Repairman E3	(C)	(C)	X	(C)	(C)	X	X	X	(C)	X	(C)	(C)	(C)	(C)
MOBILE MAINTENANCE SECTION														
63H30: Automotive Repairman Foreman E6														

1503 Remove and Install Cooling Fan

SOLDIER'S MANUAL TECHNICAL TASKS BY SKILL LEVEL 63H MOS														INSPECTION OF AUTOMOTIVE EQUIPMENT				
DUTY POSITIONS BY T08E														2526	2527	2528	2529	2530
														Troubleshoot Personnel Heaters	Troubleshoot Clutch on Wheeled Vehicles	Troubleshoot Manual Transmission on Wheeled Vehicles	Troubleshoot Automatic Transmission in Vehicles	Troubleshoot Cooling System on M60A1 Tank Engine
														2531	2532	2533	2534	2535
														Troubleshoot Electrical System on M60A1 Tank	Troubleshoot Brake System on Wheeled Vehicle	Troubleshoot Wrecker Crane on M816 5-Ton Wrecker	Troubleshoot Suspension System on Tracked Vehicle	Troubleshoot Vehicle Engines
														2536	2537	2538	2539	2540
														Troubleshoot Wheeled Vehicle Steering Systems	Troubleshoot Wheeled Vehicle Suspension Systems	Assessment and Repair of Battle Damage	Inspect Clutch Assembly	Inspect Fifth Wheels
														2541	2542	2543	2544	2545
														Inspect Hydraulic System on M816 5-Ton Wrecker	Inspect Cooling System on M60A1 Tank	Inspect Tracked Vehicle Suspension System		
SKILL LEVEL														2	2	2	2	2
MAINTENANCE CONTROL SECTION																		
63H40: Maintenance Control SGT E7																		
63H30: Technical Inspector E5																		
MECHANICAL MAINTENANCE PLATOON																		
63H40: Platoon SGT E7																		
AUTOMOTIVE MAINTENANCE SECTION																		
63H40: Section Chief E7																		
63H40: Automotive Repairman E7 Foreman																		
63H20: Automotive Repairman E5																		
63H10: Automotive Repairman F4																		
63H10: Automotive Repairman E3																		
MOBILE MAINTENANCE SECTION																		
63H20: Automotive Repairman E6 Foreman																		

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		INSPECTION OF AUTOMOTIVE EQUIPMENT	TESTING AUTOMOTIVE EQUIPMENT
2535	Troubleshoot Wheeled Vehicle Engines		
2536	Troubleshoot Wheeled Vehicle Steering Systems		
2537	Troubleshoot Wheeled Vehicle Suspension Systems		
2538	Assessment and Repair of Battle Damage		
2549	Inspect Clutch Assembly		
2550	Inspect Fifth Wheels		
2551	Inspect Hydraulic System on M816 5-Ton Wrecker		
2552	Inspect Cooling System on M60A1 Tank		
2553	Inspect Tracked Vehicle Suspension System		
2554	Inspect Powertrain of Wheeled Vehicle		
2555	Inspect the Suspension System on Wheeled Vehicle		
2556	Inspect Electrical System on Wheeled Vehicle		
2557	Inspect Brake System on Wheeled Vehicle		
2558	Inspection of Vehicle Engines		
2559	Inspect Steering System on Wheeled Vehicle		
2560	Inspect Gas Particulate Units on Tracked Vehicles		
2561	Inspect Air/Exhaust Systems on Vehicles		
2572	Test Piston Wear Limits		
2573	Test Fuel System on M60A1 Tank		
2574	Perform Fuel Flow Test on RV71T Engine Fuel Pump in M109 Howitzer		
2575	Stall Test M60A1 Tank Powerpack		
2576	Perform Cam Lobe Life Test on Camshaft in Vehicle Engine		
2577	Test Engine Exhaust and Intake Valve Springs		
2578	Measure Gear Backlash		
2579	Test Engine Block and Head for		

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FIG. 4 10 SH. 1

DUTY POSITIONS/SOLDIER'S MANUAL TASKS (SK
TECHNICAL) INTERFACE

2

Inspection/Suspension System on Wheeled Vehicle		TESTING AUTOMOTIVE EQUIPMENT											
2	2556	Inspect Electrical System on Wheeled Vehicle											
2	2557	Inspect Brake System on Wheeled Vehicle											
2	2558	Inspection of Vehicle Engines											
2	2559	Inspect Steering System on Wheeled Vehicle											
2	2560	Inspect Gas Particulate Units on Tracked Vehicles											
2	2561	Inspect Air/Exhaust Systems on Vehicles											
2	2572	Test Piston Wear Limits											
2	2573	Test Fuel System on M60A1 Tank											
2	2574	Perform Fuel Flow Test on AV71r Engine Fuel Pump in M109 Howitzer											
2	2575	Stall Test M60A1 Tank Powerpack											
2	2576	Perform Cam Lobe Lift Test on Camshaft in Vehicle Engine											
2	2577	Test Engine Exhaust and Intake Valve Springs											
2	2578	Measure Rear Backlash											
2	2579	Test Engine Block and Head for Warpage											
2	2580	Perform Preload Check on Idler Gear Bearing from AV71r Engine											
2	2581	Test Flywheel Run-Out											
2	2582	Measure Cylinder Sleeve Bore on AV71r Engine											
2	2583	Check End Play on Crankshaft of AV71r Engine											
2													

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FIG. 4 10 SH. 1

REPAIR AND ADJUSTMENT OF AUTOMOTIVE EQUIPMENT

DUTY POSITIONS BY T0&E	SOLDIER'S MANUAL TECHNICAL TASKS BY SKILL LEVEL 634 MOS	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608
		Adjust Hydraulic Pressure Switches	Remove and Install Closed Breech Scavenger System (CBSS) Compressors and Drive Gearbox	Adjust Boom and Tow Winch Brake on M578 Recovery Vehicle	Repair Hydraulic Powerpack Assembly	Repair Hydraulic System Components	Repair Hydraulic Valves	Repair End Cover Assembly on cd-850 Transmission	Repair Axle Assemblies	Repair Steering Systems	Repair Hydraulic Components	Repair Vehicle Engines	Adjust Toe-in on Wheeled Vehicle	Adjust Main Pressure and Converter Pressure Valves on M60A1 Tank Transmission Valve Body	Adjust Low and Reverse Range Band on M60A1 Tank Transmission	Adjust Shifting Linkage on M60A1 Tank
SKILL LEVEL		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
MAINTENANCE CONTROL SECTION																
63H40: Maintenance Control SGT E7																
63H30: Technical Inspector E6																
MECHANICAL MAINTENANCE PLATOON																
63H40: Platoon SGT E7																
AUTOMOTIVE MAINTENANCE SECTION																
63H40: Section Chief E7																
63H40: Automotive Repairman E7 Foreman																
63H20: Automotive Repairman E5													(B)		(C)	(C)
63H10: Automotive Repairman E4																
63H10: Automotive Repairman E3																
MOBILE MAINTENANCE SECTION																
63H30: Automotive Repairman E6 Foreman																

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2	2600	Repair End Cover Assembly on cd-850 Transmission
2	2601	Repair Axle Assemblies
2	2602	Repair Steering Systems
2	2603	Repair Hydraulic Components
2	2604	Repair Vehicle Engines
2	2605	Adjust Toe-In on Wheeled Vehicle
2	2606	Adjust Main Pressure and Converter Pressure Valves on M60A1 Tank Transmission Valve Body
2	2607	Adjust Low and Reverse Range Band on M60A1 Tank Transmission
2	2608	Adjust Shifting Linkage on M50A1 Tank
2	2609	Adjust Steering Linkage on M60A1 Tank
2	2610	Adjust Valves on AVPS-1790 Engine From M60A1 Tank
2	2611	Adjust Valves on 8V71T Engine on M109 Howitzer
2	2612	Perform Maximum No-Load Speed Adjustment on Engine of M109 Howitzer
2	2613	Adjust Idle Speed on M109 Howitzer
2	2614	Adjust Governor Gap on Engine of M109 Howitzer
2	2615	Adjust Hydraulic System on 6,000-Pound Forklift
2	2616	Adjust Intake and Exhaust Valves on M309 Series Vehicles
2	2617	Perform Fuel Rack Adjustment on 8V71T Engine in M109 Howitzer
2	2618	Adjust Gear Tooth Contact in Differential of M35A2 2-1/2- Ton Truck
2	2619	Adjust Gear Backlash in Differential of 6,000-Pound Forklift
2	2620	Adjust M109 Axles

DUTY POSITIONS/SOLDIER'S MANUAL
TECHNICAL) INTERFACE

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ENGINE FROM SPARE TANK											
2	2611	Adjust Valves on 8V71T Engine on M109 Howitzer	2								
2	2612	Perform Maximum No-Load Speed Adjustment on Engine of M109 Howitzer	2								
2	2613	Adjust Idle Speed on M109 Howitzer	2								
2	2614	Adjust Governor Gap on Engine of M109 Howitzer	2								
2	2615	Adjust Hydraulic System on 6,000-Pound Forklift	2								
2	2616	Adjust Intake and Exhaust Valves on M109 Series Vehicles	2								
2	2617	Perform Fuel Rack Adjustment on 8V71T Engine in M109 Howitzer	2								
2	2618	Adjust Gear Tooth Contact in Differential of M35A2 2-1/2-Ton Truck	2								
2	2619	Adjust Gear Backlash in Differential of 6,000-Pound Forklift	2								
2	2620	Adjust Winch Brake	2								
2	2621	Repair Standard Shift Transmission	2								
2	2622	Install, Synchronize, and Time Magneto on M88 Recovery Vehicle Engine	2								
2	2623	Install and Time Fuel Injector Pump on LDS-465-1 Engine	2								
2	2624	Repair Wheeled Vehicle Suspension Systems	2								
2	2625	Repair Tracked Vehicle Suspension Systems	2								
2	2626	Repair Main Hydraulic Pump	2								
2	2627	Repair Hydraulic Relief and Unloading Valve	2								

FIG. 4-10 SH. 2

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REPAIR AND ADJUSTMENT OF AUTOMOTIVE EQUIPMENT												
SOLDIER'S MANUAL TECHNICAL TASKS BY SKILL LEVEL 63H MOS	2628 Remove and Install Steering Node Selector Valve on the 6,000- Pound R1 Forklift	2629 Remove and Install Steering Gear Assembly on the 6,000-Pound R1 Forklift	2630 Remove and Replace Rear Axle Assembly from 6,000-Pound R1 Forklift	2631 Remove and Install Engine from 6,000-Pound R1 Forklift	2632 Remove and Install Main Hydraulic Pump on 6,000-Pound R1 Forklift	2633 Remove and Install Two-Spool Valve Assembly on 6,000-Pound R1 Forklift						
DUTY POSITIONS BY TO&E												
SKILL LEVEL	2	2	2	2	2	2	2	2	2	2	2	2
MAINTENANCE CONTROL SECTION												
63H40: Maintenance Control SGT E7												
63H30: Technical Inspector E6												
MECHANICAL MAINTENANCE PLATOON												
63H40: Platoon SGT E7												
AUTOMOTIVE MAINTENANCE SECTION												
63H40: Section Chief E7												
63H40: Automotive Repairman Foreman												
63H20: Automotive Repairman E5												
63H10: Automotive Repairman E4												
63H10: Automotive Repairman E3												
MOBILE MAINTENANCE SECTION												
63H30: Automotive Repairman E6 Foreman												

FIG

DUTY POSITIONS/SOLDIER'S MANUAL TASKS
(TECHNICAL) INTERFACE

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2620		2630		2631		2632		2633		2634		2635		2636		2637		2638		2639		2640		2641		2642		2643		2644		2645		2646		2647		2648		2649		2650		2651		2652		2653		2654		2655		2656		2657		2658		2659		2660		2661		2662		2663		2664		2665		2666		2667		2668		2669		2670		2671		2672		2673		2674		2675		2676		2677		2678		2679		2680		2681		2682		2683		2684		2685		2686		2687		2688		2689		2690		2691		2692		2693		2694		2695		2696		2697		2698		2699		2700		2701		2702		2703		2704		2705		2706		2707		2708		2709		2710		2711		2712		2713		2714		2715		2716		2717		2718		2719		2720		2721		2722		2723		2724		2725		2726		2727		2728		2729		2730		2731		2732		2733		2734		2735		2736		2737		2738		2739		2740		2741		2742		2743		2744		2745		2746		2747		2748		2749		2750		2751		2752		2753		2754		2755		2756		2757		2758		2759		2760		2761		2762		2763		2764		2765		2766		2767		2768		2769		2770		2771		2772		2773		2774		2775		2776		2777		2778		2779		2780		2781		2782		2783		2784		2785		2786		2787		2788		2789		2790		2791		2792		2793		2794		2795		2796		2797		2798		2799		2800		2801		2802		2803		2804		2805		2806		2807		2808		2809		2810		2811		2812		2813		2814		2815		2816		2817		2818		2819		2820		2821		2822		2823		2824		2825		2826		2827		2828		2829		2830		2831		2832		2833		2834		2835		2836		2837		2838		2839		2840		2841		2842		2843		2844		2845		2846		2847		2848		2849		2850		2851		2852		2853		2854		2855		2856		2857		2858		2859		2860		2861		2862		2863		2864		2865		2866		2867		2868		2869		2870		2871		2872		2873		2874		2875		2876		2877		2878		2879		2880		2881		2882		2883		2884		2885		2886		2887		2888		2889		2890		2891		2892		2893		2894		2895		2896		2897		2898		2899		2900		2901		2902		2903		2904		2905		2906		2907		2908		2909		2910		2911		2912		2913		2914		2915		2916		2917		2918		2919		2920		2921		2922		2923		2924		2925		2926		2927		2928		2929		2930		2931		2932		2933		2934		2935		2936		2937		2938		2939		2940		2941		2942	
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DUTY POSITIONS/SOLDIER'S MANUAL TASKS (SKILL LEVEL 2
TECHNICAL) INTERFACE

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DUTY POSITIONS BY TO&E	SOLDIER'S MANUAL TECHNICAL TASKS BY SKILL LEVEL 63- MOS									
	3644 Supervise Replacement of Tracked Vehicle Powerpacks	3645 Supervise Troubleshooting of Automatic Transmissions	3646 Supervise Repair and Adjustment of Automatic Transmissions	3647 Supervise Inspection and Repair of Standard Shift Transmissions	3648 Supervise Inspection, Trouble- shooting, and Repair of Wheeled Vehicle Power Trains	3649 Supervise Inspection, Trouble- shooting and Repair of Vehicle Steering Systems	3650 Supervise Inspection, Trouble- shooting, and Repair of Vehicle Suspension Systems	3651 Supervise Inspection, Trouble- shooting, and Repair of Vehicle Brake Systems	3652 Supervise Troubleshooting and Repair of Closed Breech Scavenger Systems	Supervise Inspection, Repair
SKILL LEVEL	3	3	3	3	3	3	3	3	3	
MAINTENANCE CONTROL SECTION										
63H40: Maintenance Control SGT E7										
63H30: Technical Inspector E6										
MECHANICAL MAINTENANCE PLATOON										
63H40: Platoon Sergeant E7										
AUTOMOTIVE MAINTENANCE SECTION										
63H40: Section Chief E7										
63H40: Automotive Repairman E7 Foreman										
63H20: Automotive Repairman E5										
63H10: Automotive Repairman E4										
63H10: Automotive Repairman E3										
MOBILE MAINTENANCE SECTION										
63H30: Automotive Repairman E6 Foreman										

FIG. 4-11

DUTY POSITIONS/SOLDIER'S MANUAL TASKS (SKILL LEVEL
TECHNICAL) INTERFACE

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FIG. 4-11

APPENDIX A

DA FORMS

USE TYPEWRITER OR PRINT FIRMLY ON HARD SURFACE WITH HARD PENCIL OR BALL-POINT PEN

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DA FORM 2407
1 OCT 73

EDITION OF 1 JAN 64 WILL BE USED UNTIL EXHAUSTED

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ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
8-7	Repair fuel and	Section has received DA Form 2407, Maintenance Request, requiring the repair of fuel and electric automotive components.	<ol style="list-style-type: none"> 1. DA Forms 2404/2407 are reviewed to determine required repairs. 2. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel. 3. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards. 4. Completion of work must be verified. 5. DA Forms 2404/2407 and associated TAMMS forms are completed IAW TM 38-750. 6. Prepare and turn in unserviceable repair parts. 7. Repaired item must be sent to final inspection. 8. When operating under an automated system completion of production control procedures will be IAW the requirements of the automated system. <p>REF: TM 38-750 and Applicable TM & SM</p>

For use of this form, see TM JA-750; the proponent agency is the Office of the Deputy Chief of Staff for Logistics.

DA FORM 2404
1 JAN 64

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DOCUMENT IDENTIFIER		ROUTING IDENTIFIER		FIC		RIM		ADD		UNIT OF ISSUE		QUANTITY		BLANK		FUND		DISTRIBUTION		PROJECT		PRIORITY		REQUIRED ADVISE		ROUTING		TRANSACTION		DOLLARS		CENTS	
STOCK NUMBER																								DATE		BILL OF LADING NUMBER OR SHIPMENT SERIAL NUMBER							
C		D		E		F		G		H		I		J		K		L		M		N		O		P		Q		R		S	
T		U		V		W		X		Y		Z		AA		AB		AC		AD		AE		AF		AG		AH		AI		AJ	
AK		AL		AM		AN		AO		AP		AQ		AR		AS		AT		AU		AV		AW		AX		AY		AZ		BA	
BB		BC		BD		BE		BF		BG		BH		BI		BJ		BK		BL		BM		BN		BO		BP		BQ		BR	
BS		BT		BU		BV		BW		BX		BY		BZ		CA		CB		CC		CD		CE		CF		CG		CH		CI	
CJ		CK		CL		CM		CN		CO		CP		CQ		CR		CS		CT		CU		CV		CW		CX		CY		CZ	
DA		DB		DC		DD		DE		DF		DG		DH		DI		DJ		DK		DL		DM		DN		DO		DP		DQ	
DR		DS		DT		DU		DV		DW		DX		DY		EZ		FA		FB		FC		FD		FE		FF		FG		FH	
FI		FJ		FK		FL		FM		FN		FO		FP		FQ		FR		FS		FT		FU		FV		FW		FX		FY	
FZ		GA		GB		GC		GD		GE		GF		GG		GH		GI		GJ		GK		GL		GM		GN		GO		GP	
GQ		GR		GS		GT		GU		GV		GW		GX		GY		HZ		IA		IB		IC		ID		IE		IF		IG	
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OG		OH		OI		OJ		OK		OL		OM		ON		OO		OP		OQ		OR		OS		OT		OU		OV		OW	
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YD		YE		YF		YG		YH		YI		YJ		YK		YL		YM		YN		YO		YP		YQ		YR		YS		YT	
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ZL		ZM		ZN		ZO		ZP		ZQ		ZR		ZS		ZT		ZU		ZV		ZW		ZX		ZY		ZZ					

REQUEST FOR ISSUE ON TURN-IN (AR 710-7) (MCO 7-2505)

DATE: 1 JAN 76

PREVIOUS EDITIONS WILL BE USED

For use of this form, see AR 715-35; the proponent agency is the Office of the Deputy Chief of Staff for Logistics.

[illegible]

RECORD OF DEMANDS — TITLE INSERT

DA FORM 3318 1 MAR 68

For use of this form, see AR 710-2; the Proponent Agency is Office of the Deputy Chief of Staff for Logistics.

REPLACES DA FORM 1543, 1 MAY 62 AND
DA FORM 2527 1 MAR 62, WHICH ARE
OBSOLETE.

RECORD OF DEMANDS

STOCK NUMBER

[illegible]

DETACHED FROM J313, 1 Mar 68

TITLE INSERT	REMARKS		STOCKAGE CODE	DATE	QTY
			AUTHORIZED STOCK LEVEL (USE DEMO)		
	STOCK NUMBER	ITEM DESCRIPTION		LOCATION	

EXCHANGE TAG
(TM 38-750)

1. SUPPORT AGENCY (DODAAC)		2. DATE	
3. UNIT OR ORGANIZATION (DODAAC)			
4. FSN/IFO			
5. NOUN NOMENCLATURE			
6. AIR EXHIBIT EXCHANGE		7. REPAIRED DATE INITIALS	
8. NOUN NOMENCLATURE/MANUFACTURER			
9. MODEL		10. SERIAL/LOT NO.	

DA FORM 2402, 1 SEP 73 EDITION OF 1 JAN 64, WILL BE USED.

11. UNIT OR ORGANIZATION (DODAAC)		ITEM	
12. FSN/IFO		DATE SUBMITTED	
13. NOUN NOMENCLATURE/MANUFACTURER		2	
14. SERIAL/LOT NUMBER			

(Detached from DA Form 2402)

15. UNIT OR ORGANIZATION (DODAAC)		ITEM	
16. FSN/IFO		DATE SUBMITTED	
17. NOUN NOMENCLATURE/MANUFACTURER		3	
18. SERIAL/LOT NUMBER			

(Detached from DA Form 2402)

19. NOUN NOMENCLATURE			
20. FSN/IFO		DATE SUBMITTED	
21. NOUN NOMENCLATURE/MANUFACTURER		A	
22. SERIAL/LOT NUMBER			

(Detached from DA Form 2402)

23. DATE MFG/LAST OVERHAUL		24. MANUFACTURER OR OVERHAUL ACTIVITY	
25. FAILURE DETECTED DURING			
<input type="checkbox"/> HANDLING CODE B	<input type="checkbox"/> INSPECTION/ TEST-CODE C	<input type="checkbox"/> SGT MAINTENANCE CODE A	<input type="checkbox"/> NORMAL OPERATION CODE D
26. FIRST INDICATION OF TROUBLE			
<input type="checkbox"/> INOPERATIVE CODE 066	<input type="checkbox"/> LOW PERFORM- ANCE-CODE 387	<input type="checkbox"/> NOISY CODE 008	<input type="checkbox"/> OTHER CODE 099
<input type="checkbox"/> OUT OF ADJUST- MENT-CODE 790	<input type="checkbox"/> OVERHEATING CODE 259	<input type="checkbox"/>	<input type="checkbox"/>
27. DESCRIBE DEFICIENCIES OR SYMPTOMS			
28. J.O.#			
29. INITIALS			
30. J.O.#			
31. DATE			
32. SIGNATURE			
33. DATE			
34. SIGNATURE			
35. DATE			
36. SIGNATURE			

REJECTION MEMORANDUM

(FM 9-4)

TO: (Shop or Bay)

JOB ORDER NUMBER

Material or equipment is being returned for correction of the following deficiencies:

DATE

INSPECTOR

DA FORM 829
1 DEC 93

PREVIOUS EDITION MAY BE USED.

GPO:1999-O-530017

APPENDIX B

WORK FLOW ACCORDING TO DOCTRINE

Work Flow According to Doctrine. From FM 29-23, Chapter 4.

1. Customer takes vehicle, 2407 (Maintenance Request), and equipment log to the Maintenance Control Section.
2. Shop Office (Maintenance Control Section):
 - a. receives vehicle and 2407.
 - b. checks accuracy of 2407..
 - c. verifies presence of vehicle listed on 2407.
 - d. signs for receipt of vehicle on 2407, copy 1.
 - e. returns receipt copy of 2407, copy 1, to customer.
 - f. job is entered on 2405 (Maintenance Request Register).
 - g. job envelope is placed in tub file, initial inspection.
 - h. colored priority tag on production control board is initiated for job and is put under Initial Inspection when vehicle is turned over to TI element.
 - i. vehicle, 2407 copies 2-5, 2404 (Equipment Inspection and Maintenance Worksheet) and equipment log are sent to TI element.
3. TI element (Maintenance Control Section):
 - a. receives vehicle, 2407, 2404, and equipment log.
 - b. uses 2404 to list equipment faults including those which should have been corrected by organizational level personnel.
 - c. uses technical manuals and technical bulletins to help in the inspection.
 - d. uses technical manuals and pamphlets to look up parts numbers.
 - e. list needed parts on 2404.
 - f. sends 2404, 2407, and equipment log back to maintenance control section.
 - g. vehicle is sent to designated holding area.

4. Production Control Element (Maintenance Control Section):

- a. receives 2404, 2407, and equipment log.
- b. decides whether repair will be accomplished locally or whether vehicle will be evacuated.
- c. completes 2407, closes out maintenance request, sends equipment log with vehicle, and initiates 2408-9 (Equipment Control Record) if vehicle is to be evacuated.
- d. prepares 2407-1 (Maintenance Request - Continuation Sheet) if local repair.
- e. lists needed parts, job order number, job priority on 2407-1.
- f. determines work priorities.
- g. determines if float item is to be used.
- h. determines routing of job.
- i. puts routing on 2407-1.
- j. after routing, 2404, 2407 copies, and 2407-1 are placed in a job order envelope and put in the tub file, Awaiting Parts, if there is going to be a delay in getting sufficient parts.
- *k. sends a copy of 2407-1 or 2675 (Request for Issue or Turn In) to shop supply.
- l. changes tag on production control board to Awaiting Parts.

5. Shop Supply Element (Maintenance Control Section):

- *a. receives either a copy of 2407-1 or 2765.
- b. reviews the parts request on 2407-1 or 2765 or fills out 2765-1 (Request for Issue or Turn-In, manual form) based on information from 2407-1.
- c. makes entries on 2064 (Document Register for Supply Action).
- d. enters repair parts document number on 2407-1.

* Paragraph 4-31.c.(6) states "A copy of the DA Form 2407-1....is sent to shop supply..." while paragraph 4-34 states "...the clerk in the control section forwards all copies (underlining mine) ... to the shop supply section."

- e. white control copy of 2407-1 is sent to production control and filed 2407 in tub file to act as a voucher indicating shop supply action.
 - f. remaining copies of 2407-1 are held in shop supply until parts are received.
 - g. annotates supply source for requested item (shop supply stock or unit supply platoon).
 - h. enters number of items that can be supplied from shop supply.
 - i. makes entries on 3318 (Records of Demand) if stockage decision has been made by commander.
 - j. forwards 2765 to stock control section for action on remaining supply items.
 - k. receives copy of request annotated with a control number assigned by technical supply.
 - l. copy of request is filed in a suspense file.
 - m. control number assigned by technical supply is entered on 2064.
 - n. follows-up on requests. Exact follow-up time varies with priority assigned request.
 - o. follow-up action is noted on 2064 and 2765 by entering AF1.
 - p. technical supply notifies shop remaining supply parts are in. Parts are picked up and stored in shop supply until needed.
 - q. date and quantity of parts received is entered on 2064.
 - r. the quantity entry on 2407-1 may be circled to indicate received part.
 - s. all remaining copies of 2407-1 are sent to Maintenance Control Section.
6. Shop Office (Maintenance Control Section):
- a. is notified when parts are available.
 - b. changes job order envelope in tub file to Awaiting Shop.
 - c. control board tag is changed to Awaiting Entry.

- d. vehicle and a copy of 2407-1 are sent to Automotive Maintenance Section.
- e. job order envelope in tub file is changed to In Process.
- f. control board tag is changed to Awaiting Entry.
- g. date the job entered shop is entered on 2405.

7. Automotive Maintenance Section:

- a. receives vehicle and 2407-1.
- b. uses 2407-1 as worksheet to avoid mutilation of 2407. Allowed to use 2404 or 2407 as a worksheet.
- c. a copy of parts request form should accompany 2407-1 to indicate what parts have been ordered and the action that has been taken thereby preventing reordering in case other items have been delayed in getting there.
- d. immediately brings attention to production control any delays occasioned by a lack of parts, overloading, halts in work, or reduced efficiency.
- e. if additional parts are needed, item may be evacuated or again placed in Awaiting Parts category.
- f. need for additional parts should be verified by section chiefs or inspectors.
- g. date of available parts should be given to production control.
- h. performs in-process inspection.
- i. If item is rerouted production control is notified and its location reflected on the control board.
- j. completes 2407-1, 2404, or 2407 and indicates the repair operations that have been completed, manhours expended on repair operation, and parts used.
- k. when repair is completed, 2407-1, 2404, or 2407 is sent to final inspection.
- l. turns in to shop supply any parts not used in the repair.
- m. turns in any components that can be repaired or salvaged.

n. notifies maintenance control section vehicle is ready for final inspection.

8. Shop Office (Maintenance Control Section):

- a. pulls 2404 from tub file and routes it to TI element for final inspection.
- b. changes job order envelope in tub file to Final Inspection.
- c. control board tag is changed to Final Inspection.

9. Technical Inspection Element:

- a. receives 2404 and 2407-1.
- b. makes final inspection and determines whether vehicle passes or fails inspection.
- c. sends 2404 to maintenance control section if vehicle passes inspection.

10. Shop Office (Maintenance Control Section):

- a. receives 2404.
- b. control board tag is changed to Complete (Awaiting Pick-Up).
- c. information from 2407-1 is transcribed to 2407.
- d. customer is notified vehicle is ready.
- e. 2407 is completed.
- f. entries made in the equipment log.
- g. job order envelope in tub file is changed to Completed, Awaiting Disposition.

11. Customer.

- a. gives maintenance control section number one copy of 2407.
- b. signs remaining copies of 2407 signifying receipt of the repaired item.

12. Shop Office (Maintenance Control Section):

- a. receives copy of 2407 from customer.
- b. gives customer 2404, copies of 2407, and equipment log.

- c. turns vehicle over to customer.
- d. makes entries into 2405.
- e. production control board tag is removed.

APPENDIX C

WORK FLOW PROCESS ACTIVITY BLOCK DESCRIPTIONS

Activity Block Number 1

Title: Process Incoming Jobs

Description: Performs initial paperwork to allow vehicle to be inspected.

Duty Position: Maintenance Control Sergeant

MOS: 63H40

- Tasks:
1. Monitor shop office clerk for proper operation, e.g., up-to-date posting of tub file, production control board and correct entries on 2405.
 2. Monitor types of jobs to identify technical difficulties, e.g., high number of 113A1 engines failing would require an investigation by Maintenance Control Section.

Duty Position: Shop Office Clerk

MOS: 76L10

- Tasks:
1. Receives 2407 Form
 2. Checks accuracy of 2407 Form
 3. Checks for authorized signature
 4. Initials top right corner if properly filled out
 5. Sends customer to appropriate section

Activity Block Number 2

Title: Perform Technical Inspection

Description: Inspects vehicle and accepts or rejects vehicle.

Duty Position: Maintenance Control Sergeant

MOS: 63H40

- Tasks:
1. Monitor T.I. element to:
 - a. Assure adequate staffing to meet workload
 - b. Provide adequate quality check on organizational maintenance and to effectively respond to inadequate maintenance on the part of those units.
 - c. To assure proper organization and functioning:
 - (1) Correct T.I. procedures.
 - (2) Complete files
 - (3) Adequate library
 - d. Assure technical proficiency of T.I. element
 - e. Identify training needs

Duty Position: Technical Inspector

MOS: 63H30

- Tasks:
1. Checks organization level diagnosis
 2. Checks to see that the first and second echelon deficiencies are worked off
 3. Checks for third echelon deficiencies
 4. Accepts or rejects vehicles based on number of points from deficiencies
 5. When T.I. rejects vehicle, he notifies shop clerk who closes out shop order and annotates rejection on 2404.
 6. Files a copy of 2404 by unit
 7. When T.I. accepts vehicle he fills out a 2407-1 (appropriate information needed to order parts)
 8. Maintains updated reference library.

Activity Block Number 2A

Title: Vehicle Accepted?

Description: Shop clerk takes action depending upon whether T.I. accepts or rejects vehicle.

Duty Position: Shop Office Clerk

MOS: 76D10

- Tasks:
1. Receives 2407 back from T.I. Signed in block 24.
 2. Logs in Job Order Number on 2405. Special attention is given to Serial Number and Administrative Number (bumper number).
 3. Gives customer the number one receipt copy of 2407. Logs in Job Order Number on 2407.
 4. Construct job order package. Necessary entries are: Owning Unit, Job Order Number, Date Accepted, Bumper Number and Type of Equipment.
 5. Make and post control tab to PC board.
 6. Identifying tag to Equipment Logbook.
 7. When parts have been ordered and packet returned to Job Order Records Section, place the entire packet in tub file under the appropriate status. If necessary move control tag on PC board.

Activity Block Number 3

Title: Monitor Shop Supply Element.

Description: Monitor of shop supply to assure minimal delay in providing repair parts.

Duty Position: Maintenance Control Sergeant

MOS: 63H40

- Tasks:
1. Monitor shop supply to assure effective internal operation.
 - a. Adequate demand stock
 - b. Proper requisition, follow-up and posting procedures.
 2. Coordinate work flow between shop supply element and automotive element.

Decision Point Number 3.1

Title: Parts on Hand?

Description: Determine if parts are in shop supply.

Duty Position: Shop Supply Clerk

MOS: 76D10

- Tasks:
1. Receives 2407-1 from Shop Office
 2. Looks in the 3318 and determines if part is in stock.
 3. If part is available, circle part requested on 2407-1.
 4. Request signature across 2407-1 to acknowledge receipt. Issues control copy with part.
 5. If part is in, notifies Shop Office the job status is in shop.
 6. Forwards 2407-1 to Shop Office for filing.
 7. Put 2407-1 in parts bin, waiting pickup.

Activity Block Number 3.2

Title: Reorder as Required

Description: Bring stock supply up to authorized level

Duty Position: Shop Supply Clerk

MOS: 76D10

Tasks: 1. Gets part information from 3318.
2. Reorder when reorder level is reached or reorder 1 for 1 part.
3. Fill out Form 2765.

Decision Point Number 3.3

Title: DX Item? DX Available?

Description: Determine if parts should be in DX shop and if so is the replacement component available.

Activity Block Number 3.4

Title: Initiate DX Component Pull

Description: Notify appropriate personnel and prepare paperwork for component pull

Duty Position: Shop Supply Clerk

MOS: 76D10

Tasks: 1. Notifies Shop Clerk to place packet in Waiting Parts Tub File.
2. Tells Shop Clerk to notify Shop Officer to pull component.

Activity Block Number 3.5

Title: Pull DX Component

Description: Remove component from vehicle

Duty Position: Automotive Repairman
Track Vehicle Mechanic
Wheel Vehicle Mechanic

MOS: 63H10
63C10
63B10

Tasks: 1. Obtain reference manuals.
2. Remove component from vehicle.
3. Clean component and crate it.

Activity Block Number 3.6

Title: DX Component

Description: Take removed component to DX Shop

Duty Position: Shop Supply Clerk

MOS: 76D10

- Tasks:
1. Prepare 2402
 2. DX component
 3. If item is available, Shop Clerk is notified and Job Order becomes Waiting Shop.
 4. If item is not received, file number from copy of 2402.
 5. Maintain record of DX component status by Job Order Number.

Activity Block Number 3.7

Title: Order Parts

Description: Requisition part through technical supply

Duty Position: Shop Supply Clerk

MOS: 76D10

- Tasks:
1. If part is not on hand verify part description on 2407-1 against microfilm record.
 2. Notate appropriate information on 2064, Document Register.
 3. Make out a Request for Issue Card, 2765-1.

Activity Block Number 3.8

Title: Update Status

Description:

Duty Position: Shop Supply Clerk

MOS: 76D10

- Tasks:
1. Update Document Register with status or Request for Status.
 2. Provide shop office with Status update and modify shop officer or maintenance control SGT of specific problem, e.g., excessive part delay and cancellations.

Activity Block Number 3.9

Title: Request Status

Description: Constantly monitor progress of each requisition

Duty Position: Shop Supply Clerk

MOS: 76D10

- Tasks:
1. If part or status is not received after appropriate time frame, request follow-up (AFI).

Activity Block Number 3.10

Title: Process Parts for Waiting Shop

Description: Processes paperwork to allow shop to use parts.

Duty Position: Shop Supply Clerk

MOS: 76D10

- Tasks:
1. When part comes in make appropriate entries on 2064. Enter quantity due in, quantity received, Julian date for parts in, Job Order number or Bumper number.
 2. Fill out 2407-1. Circle part number on form when part comes in. Get signature from mech maintenance before issuing part. Put parts in proper bin.
 3. Demand is recorded on 3318 and current stockage is notated.

Activity Block Number 4

Title: Process Work to Shop

Description: Maintain Effective Production Control System

Duty Position: Maintenance Control Sergeant

MOS: 63H40

- Tasks:
1. Prioritize work to automotive section.
 2. Monitor work flow to automotive section to assure a backlog does not occur.
 3. Adjust production control system to alleviate any backlog.
 4. Monitor automotive section to assure adequacy of in-shop procedure and adequate manpower utilization, e.g., section working at capacity.

Duty Position: Shop Office Clerk

MOS: 76D10

- Tasks:
1. When Job Packet is returned, it is filed in tub file as Waiting Parts, Waiting Shop, or In Shop
 2. Updates tub file.
 3. Advises Maintenance Control Section of tub file status.
 4. When an item of equipment changes status to Waiting Shop the following procedures apply:
 - a. Remove the white control copy of DA Form 2407 from the job order packet and place it in the box of the section that will accomplish the work.
 - b. Move the job order packet and the control tag on the PC board to Waiting Shop status.
 - c. The Section Representative picks up the paper work.

Activity Block Number 5

Title: Process Incoming Jobs

Description: Maintain Effective Internal Production Control System

Duty Position: Maintenance Section Chief

MOS: 63H40

- Tasks:
1. Effective manpower utilization
 2. Organize section into work teams:
 - a. Utilize task rotation records
 - b. Mix experienced, inexperienced personnel.
 3. Log job in on 2405.
 4. Make up job packet, 2407 and 2404.
 5. Assign job to a team
 6. Assure proper training and cross-training of mechanics.
 7. Report status of jobs in process to Maintenance Control Section. Immediately notify section of difficulties.

Activity Block Number 6

Title: Perform Fuel/Electrical Maintenance

Description: Repair any fuel/electrical problem

Not addressed in this effort as both observed D.S. companies did not have an operational F&E element.

Activity Block Number 7

Title: Repair Tracked Vehicles

Description: Perform Automotive Repair

Duty Position: Automotive Repair Foreman

MOS: 63H40

- Tasks:
1. Supervise automotive repairmen in the repair of track vehicles.
 2. Provide in-process inspection.
 3. Inspect and perform operational check of completed repairs.
 4. Record GO/NO GO on job and hours of each individual.
 5. Submit job packet to section chief.
 6. Instruct and demonstrate proper repair and replacement procedures to lower skilled personnel.

Duty Position: Automotive Repair Foreman (Mobile Maintenance Section)

MOS: 63H30

- Tasks:
1. In charge of Mobile Maintenance Team (contact team). Responsibilities include troubleshoot and supervise inspection and repair of wheel and track equipment.
 2. Assist or perform duties of automotive foreman.
 - a. Assist or supervise work teams.
 - b. Assist or perform in-process inspections.
 - c. Assist or inspect and perform operational checks of repaired vehicles
 - d. Assist or rate mechanic on GO/NO GO on task performance.
 - e. Submit job packet to Section Chief.
 - f. Assist in or instruct and demonstrate proper repair and replacement procedures to lower skilled personnel.

Duty Position: Track Vehicle Repairman
MOS: 63C10, 63H10, 63H20
Tasks: 1. Perform automotive repair on tracked vehicle.

Activity Block Number 8

Title: Repair Wheeled Vehicles
Description: Repair or replace components on wheeled vehicles .

Duty Position: Automotive Repair Foreman
MOS: 63H40
Tasks: 1. Supervise automotive repairmen in the repair of track vehicles.
2. Provide in-process inspection.
3. Inspect and perform operational check of completed repairs.
4. Record GO/NO GO on job and hours of each individual.
5. Submit job packet to section chief.
6. Instruct and demonstrate proper repair and replacement procedures to lower skilled personnel.

Duty Position: Automotive Repair Foreman (Mobile Maintenance Section)
MOS: 63H30
Tasks: 1. In charge of Mobile Maintenance Team (contact team). Responsibilities include troubleshoot and supervise inspection and repair of wheel and track equipment.
2. Assist or perform duties of automotive foreman:
a. Assist or supervise work teams
b. Assist or perform in-process inspections.
c. Assist or inspect and perform operational checks of repaired vehicles.
d. Assist or rate mechanic on GO/NO GO on task performance.
e. Submit job packet to Section Chief.
f. Assist in or instruct and demonstrate proper repair and replacement procedures to lower skilled personnel.

Duty Position: Wheel Vehicle Repairman
MOS: 63H10, 63H20, 63B10
Tasks: 1. Perform automotive repair on wheeled vehicles

Activity Block Number 9

Title: Process Out-Going Jobs
Description: Complete paperwork to ready vehicle for technical inspection

Duty Position: Section Chief or Automotive Foreman
MOS: 63H40
Tasks: 1. Section Chief completes entries on 2405. His signature accepts job packet.
2. Review and file job packet (control copy of 2407-1 plus 2404).
3. Attach DA 829 if job is rejected at final inspection.
4. Update job file guide (task rotation and task performance).
5. On 2405, record In Shop date, job completion date, job number, vehicle type, bumper number, organization, number of personnel on job, and manhours.
6. Identifies training needs.

Activity Block Number 10

Title: Perform Final Technical Inspection

Description: Inspects vehicle after job is completed

Duty Position: Technical Inspector

MOS: 63H30

- Tasks:
1. Performs final inspection upon completion of work to verify quality and completeness of job
 2. Inspects vehicle to assure vehicle is in same condition as when originally inspected.
 3. Fills out two copies of the Rejection Memo, Form 829, when vehicle is rejected.
 4. Files one copy of 829
 5. Attaches one copy of 829 to 2407 control copy
 6. Signs 2407 and forwards it to shop office if vehicle passes inspection.

Activity Block Number 11

Title: Process Completed Job Order

Description: Completes and files paper work and notifies customer vehicle is ready.

Duty Position: Shop Office Clerk

MOS: 76D10

- Tasks:
1. Post all information on white copy to basic DA Form 2407. Entries should include information in blocks 17a., b., c., 18, 20 (as required), 25, 26 and 28 (with appropriate entry).
 2. NORS/NORM time will be computed and entered in block 33.
 3. Post information to DA Form 2405 as follows: date started, date completed, and manhours.
 4. Post Serial Number of new assemblies to log book DA Form 1408-10.
 5. Move tag on PC board to Waiting Pick-up.
 6. Place completed job order packet in appropriate Unit Pick-up box.
 7. Notify unit.
 8. Units having items to pick up should be notified twice daily until item is picked up. If item waits for more than two work days notify NCOIC of Shop Office.
 9. The authorized Unit Representative will present a hand receipt (green copy) for the equipment.
 10. The representative will sign and date block 27 of the DA Form 2407.
 11. Copy #4 (blue) will be removed from DA Form 2407 and 2407-1.
 12. Log book will be removed and returned to the customer.
 13. Tag will be removed from PC Board.
 14. Dated entry will be made on 2405 in column headed Parts.
 15. No. 2 copy of DA Form 2407 and DA Form 2407-1 will be detached and fastened together and placed in box for BMO.
 16. If work request is completed, No. 5 hard copy of DA Form 2407 and DA Form 2407-1 and 2404 will be fastened together and placed in box marked cleared.
 17. Maintains, updates, and files Daily Deadline Report for 90 days.

APPENDIX D

DATA COLLECTION AND ANALYSIS FORMS AND PROCEDURES

Filled out by shop clerk

Sent to shop officer each Fr

305(a) or 2407	2405(b)	2407(#23)	2405(f) or 2407(#24)	2407-1	2407-1	2405(g) or 2407(#25)	2405(h) or 2407(#26)	2407(#27)	829	
Job Order Number	Vehicle Type	(A) Date Submitted	(B) Date Job Order Received	(C) Date Parts Ordered (Stock)	(D) Date Parts Received (Stock)	(E) Date In Shop	(F) Date Out of Shop	(G) Date Inspected	(H) Date Picked Up	Rejected (I)(F)
WF041	Wheel	8129	8129	(8129)	(8129)	8130		8131		
WF042	Wheel	8130	8130	(8130)	(8130)	8131		8132		
WF047	Track	8131	8131	(8131)	(8131)	8135		8137		
WF050	Tank	8132	8132	(8132)	(8132)	8135		8136		
WF058	Wheel	8136	8136	(8136)	(8136)	8137		8139		
WF062	Wheel	8137	8137	(8137)	(8137)	8137		8145		
WF089	Wheel	8144	8144	(8144)	(8144)	8145		8151		
WF968	Wheel	8118	8118	8124	8137	8139		8156		F
TF107	Track	8149	8149	(8149)	(8149)	8151		8156		
WF119	Wheel	8151	8151	(8151)	(8151)	8151		8152		

Filled out by shop supply clerks

Sent to shop officer each Fri

	2064	2407-1	2402
Date Reorder point Reached or Parts Issued	Date Parts Stockage - Reordered. Doc Reg #	(Date Part Reordered - Date Point Reached)	Date of Request for DX Pull
			(DXed Date -- Date of Request for DX Pull)
8130	8135	3 days	8129 <u>8157</u> 20 days
8131	8139	6 days	
8132	8136	2 days	
			8137 <u>8157</u> 14 days
Average:	3.67 days		Average: <u>17.0</u> days

Work Flow Analysis, Form C
From Form A
Computed by Shop Office

Work Segment Number:

	I	II	III	IV
Number Received	Number In Process NORM	Number Completed (#) NORM	Number In Process NORM	Number No Current Status
(B-A) / # Std = 1	(C-B) / # Std = 1	(D-C) / # Std = 1	(E-D) / # Std = 1	
WHEEL	7		$\frac{4}{7} = .57$	$\frac{6}{7} = .86$
TRACK	2		$\frac{0}{2} = 0$	$\frac{4}{2} = 2.0$
TANK	1		$\frac{0}{1} = 0$	$\frac{1}{1} = 1.0$
F/E				

VII

VI

V

(H:G) / #
Std = 1

*NORM
V + VI

(G-F) / #

*(F-E) / #

NORS. II+
III + IV

WHEEL

TRACK

TANK

F/E

A= Date Submitted
B= Date Job Order Received
C= Date Parts Ordered
D= Date Parts Received or Waiting Shop
E= Date In Shop
F= Date Out of Shop
G= Date Inspected
H= Date Vehicle Picked Up

Std = in days
* = Job specific

Computed by Shop Office

% Maint
Utilization
(Actual ÷
Available)

Actual
Maint
Manhrs

Avail
Maint
Manhrs

% TI
Utilization
(Actual ÷
Available)

Actual
TI
Manhrs

Avail
TI
Manhrs

Mean
Hours/
Final
Insp

Mean
Hours/
Initial
Insp

Mean
Tech
Std/
Job

Total
Tech
Std

Mean
Maint
Hours/
Job

Total
Maint
Hours

$$\frac{33}{6} = 5.5 \text{ hours}$$

$$\frac{20.9}{2} = 10.5 \text{ hours}$$

$$\frac{13.1}{1} = 13.1 \text{ hours}$$

$$\frac{63}{6} = 10.5$$

$$\frac{34}{2} = 17.0$$

$$\frac{8}{1} = 8.0$$

WHEEL

TRACK

TANK

F/E

TOTALS

MONTHLY PRODUCTIVITY REPORT AUTOMOTIVE MAINTENANCE SECTION

VEHICLE TYPE	NUMBER RECEIVED	NUMBER IN-PROCESS			COMPLETED				AVE M-H/ JOB		MANPOWER AVAILABLE
		NORS	NORM	TOTAL	TOTAL	AVERAGE NORS TIME	AVERAGE NORM TIME	AVERAGE TURN- AROUND TIME	TOTAL MANHOURS	TECH AVE STD	
WHEEL						2.2	3.7	6.4	10.5	5.5	
TRACK						2.0	2.5	4.5	17.0	10.5	
TANK						1.0	1.0	2.0	8.0	13.1	
FUEL/ ELEC											
TOTALS OR MEAN						2.0	3.2	5.6	11.7	7.4	

Entries on Page 1 of Form A by Shop Clerk

1. After vehicle is received and 2407 is returned to Shop Clerk, enter Job Order Number, vehicle type (tank, track, wheel), date submitted, and date received from 2407 in columns one, two, three, and four. The same data in columns one, two, and four can be taken from 2405 Shop Log.
2. Enter date that parts are ordered in column five from 2407-1. If parts are ordered from stockage, put parentheses around date.
3. Enter date that parts are received in column six. Shop supply clerk will notify you when part comes in, or obtain same date from 2407-1.
4. Enter date from 2407 or 2705 that vehicle goes In Shop, in column seven.
5. Enter date from 2407 or 2404 Out of Shop in column eight. (Not presently recorded).
6. Enter date inspected from 2407 or 2405 in column nine.
7. Enter date unit picks up vehicle in column ten.
8. If rejected at initial inspection, put "I" in column eleven. If rejected at final inspection, put an "F".

Entries on Page 2 of Form A by Shop Clerk

1. Enter the number of repair manhours from 2407.
2. Enter standard number of repair manhours for each job from Standard Manhour Guide: Tactical Vehicles.
3. Enter the number of hours from the 2407 for the initial inspection in column three.
4. Enter the number of hours from the 2407 for the final inspection in column four.
5. Each morning determine the number of mechanics available for morning shop duty. Enter that number in the appropriate 0800 Hours column. Obtain number by calling Mechanics Maintenance Section Chief.
6. Each afternoon determine the number of mechanics available for afternoon shop duty. Enter that number in the appropriate 1300 Hours column.
7. Enter the number of Technical Inspectors available for morning inspection duty in the 0800 Hours blank and enter the number of Technical Inspectors available for afternoon inspection duty in the 1300 Hours blank.

Entries by Shop Supply Clerk on Data Collection Form B, Page 1

1. Enter Job Order Number from the 2407-1 in column one.
2. Enter date that parts are ordered in column two from 2407-1. If parts are ordered from stockage, put parentheses around date.
3. When status is received, enter that date in column three and the status of the component in column four.
4. If status is not received in allotted time, enter date that a request for status is made in column five. This is AF1.
5. Enter date that parts are received in column six.
6. Place check in column seven if 2407-1 is returned with additional parts noted. Also, enter the Document Register Number in column eight from 2407-1.
7. If the NSNs of the parts ordered by the Technical Inspector on the 2407-1 differ from the numbers on microfilm, circle yes in column nine. If there are no differences, circle no.

Entries by Shop Supply Clerk on Data Collection Form B, Page 2

1. Enter the date stockage reaches a reorder point in column one.
2. When that stockage is reordered, write down in column two the Document Register Number from the 2064.
3. Enter the difference in days between columns one and two in column three.
4. When a request is made for a part to be pulled to have it DXed, enter that date from the 2407-1 in column four.
5. Enter the actual DXed date from the 2402 in column five.
6. Enter the difference in days between columns four and five in column six.

Computational Procedures for Work Flow Analysis Form C

All of the information on this form is computed from Form A. The information on this form is determined by individual jobs. When a job is entered on Form A under Job Order Number, all the information in that row on Pages 1 and 2 refers to that job.

1. Determine the number of wheel, track, and tank vehicles received by looking at the letter code under Job Order Number, column one, and Vehicle Type, column two, Form A. Enter total numbers for each type vehicle and Number Received.
2. A job is In Process NORS if parts are ordered but there is no date for parts received on Form A. Enter the totals under Number in Process NORS for wheel, track, and tank vehicles.
3. A job is Completed NORM if there is both a date for In Shop and a date for Out of Shop on Form A. Enter the totals under Number Completed (#) NORM for each vehicle type.
4. A job is In Process NORM if there is a date for In Shop but no date for Out of Shop. Enter the number of jobs In Process NORM for each vehicle type.
5. To fill in the blanks in column five, labeled I on Form C, refer to the columns labeled A and B on Form A. Subtract the date in column A from the date in column B for each job. When subtracting dates here and elsewhere on this form, be sure not to include weekend days or holidays as part of the elapsed time. Refer to a Julian calendar. Next, add the differences in days for all of the wheeled vehicles. Take this total and divide it by the number of wheeled vehicles that are Completed (#) NORM. Enter your answer on the form. Do the same thing for the tracked vehicles and the tanks. Be sure to divide the track and tank totals by the correct Number Completed (#) NORM.
6. Use the same procedures in Step 5 above to fill in the columns marked II, III, IV, V, VI, and VII on the Analysis Form C. That is, find the columns marked either B, C, D, E, F, G, or H on Form A and determine the differences in days. Add the differences for each type of vehicle and divide by the proper Number Completed (#) NORM.
7. For No Current Status, look at *Status of Part column four on Form B, Page 1. Determine the number of jobs for each vehicle type whose priority date has expired. Enter totals.
8. Complete NORS II + III + IV by adding the days in the previous columns marked II, III and IV on Form C. Enter those totals by vehicle type.
9. Complete NORM V + VI by adding the days in the previous columns marked V and VI on Form C. Enter those totals by vehicle type.

Training and Manhour Analysis Form D Computations

1. To determine Total Maintenance Hours by vehicle type, use Data Collection Form A, page two. Determine vehicle type, wheel, track, and tank. Total the hours by vehicle type and enter those totals on this form.
2. To determine the Mean Maintenance Hours/Job, take the Total Maintenance Hours from column one and divide by the Number Completed (#) NORM for that type of vehicle found in column three on the Workflow Analysis Form C.
3. To determine the Total Technical Standard, go to page two of Form A and total the hours by vehicle type. Enter the totals in column seven of this form.
4. To determine the Mean Technical Standard per Job, take the number of hours from column three and divide by the Number Completed (#) NORM jobs for each type of vehicle.
5. To determine the Mean Hours per Initial Inspection, sum the T.I. initial inspection man-hours by vehicle type and divide by the number of entries.
6. To determine the Mean Hour per Final Inspection, sum the T.I. final inspection man-hours by vehicle type and divide by the number of entries.
7. To determine the Available Maintenance Manhours, go to Form A, page two, and copy the total from the bottom line of the form and enter on the Analysis Form.
8. The Actual Maintenance Manhours is the total of all entries in the column of this Form. Enter that sum in the Actual Maint Manhours column.
9. To determine the % Utilization divide the Actual Maint Manhours by the Available Maint Manhours.
10. The Available T.I. Manhours is taken from the bottom of Form A, page two.
11. The Actual number of T.I. hours is the total of the initial inspection and the final inspection hours on Form A, page two.
12. To determine % T.I. Utilization, divide actual by available T.I. hours.

Procedures to Fill In Company Commander's Form

1. Number Received: Copy from Form C.
2. NORS In-Process: Copy from Form C.
3. NORM In-Process: Copy from Form C.
4. Total In-Process: Add the numbers in the NORS and NORM columns, Form C. Enter sum in Total column by vehicle type.
5. Total Completed: Copy from Number Completed (#) NORM from Form C.
6. Average NORS Time Completed: Copy from NORS II + III + IV column on Form C.
7. Average NORM Time Completed: Copy from NORM V + VI column on Form C.
8. Average Turnaround Time Completed: Sum the numbers in the following columns on Form C: column "I" + column "NORS II + III + IV" + column "NORM V + VI" + column "VII." Enter these totals by vehicle type.
9. Total Manhours: Copy from "Total Maintenance Hours" column on Form C.
10. Average Manhours Per Job: Copy from "Mean Maintenance Hours/Job" on Form D.
11. Average Tech Std: Copy from "Mean Tech Std/Job" on Form D.
12. Manpower Available: Copy from "Available Maintenance Mahours" on Form D.
13. Totals or Mean: Add the numbers in the columns labeled NUMBER RECEIVED, NORS, NORM, TOTAL IN-PROCESS, TOTAL COMPLETED, TOTAL MANHOURS, and enter those sums in this bottom row. Also take the average of the columns labeled AVERAGE NORS TIME, AVERAGE NORM TIME, AVERAGE TURNAROUND TIME, AVERAGE MANHOURS/JOB, and the AVE TECH STD. Enter those averages in this bottom row.

Company Commander's Analysis

Number Received

The number received by vehicle type gives the Company Commander the distribution of vehicles coming into the shop.

Number in Process

NORS gives the number of idle vehicles by type that are waiting parts.

NORS gives the number of vehicles that are currently being worked on.

TOTALS give the commander the nonoperational vehicle distribution by type or by status.

Completed

Totals for completed vehicles give distribution of work completed by type.

Average NORS time gives indication of supply wait by vehicle. May give indication of supply problems.

Average NORM time gives rank order of repair times by type of vehicle. May give indication of areas needing more training and other problem areas. .

Average Turnaround Time gives time from date submitted to date passed final inspection. This gives the true time vehicle is nonoperational.

Manhours

Total manhours expended for completed and in-process vehicles by type tells where labor is being expended. This information with average NORM time gives Commander an idea of shop problem areas.

Average Manhours per job gives an indication of the efficiency of the shop. Commander can compare average manhour per job to standard hours per job.

Manpower Available - can compare available manpower in hours to hours actually used to determine utilization of labor force.

APPENDIX E

WORK FLOW PROCESS WORK SEGMENTS WITH
RELATED PERFORMANCE MEASURES AND DIAGNOSES

I. Primary Measure: Date Submitted to Date Received
Standard: 1 Day
Source: 2407

<u>Reason Standard Was Exceeded</u>	<u>Check Reason, Additional Data Sources</u>	<u>Possible Actions</u>
1. Shop Officer/Maintenance Control Sgt.	1. Check TI manhours on TI Form D. Compare Actual Hours to Potential Hours.	1. Managerial decisions
a. Actual hours same as potential		a. Extend work day
(1) Number of vehicles that need to be inspected exceeds available T.I. hours.		b. Increase T.I. staff
(2) T.I. element - enough T.I.s and working adequate hours but technical ability hinders productivity		c. Modify internal procedures for T.I. element
(a) Either T.I.s do have adequate troubleshooting ability in general or they could lack vehicle specific technical knowledge. On 2404, look at troubleshooting procedures. Inspect library. Each vehicle requires 3 manuals or more.		d. Impose tighter internal control
(b)		
(c) Look for high occurrence of additional parts.		
(d) Look at vehicle history.		
(e) Compare time/inspection against total time put into inspections. If time/inspection is high, then this could indicate inexperience or lack of technical ability. If time/inspection is low then this could indicate T.I. is not fully doing his job. If time/inspection is high, could be T.I. is inflating his actual work hours.		

Reason Standard Was Exceeded

Check Reason, Additional Data Sources

Possible Actions

- b. Actual hours greater than potential hours
 - (1) Improper record keeping
- c. Actual hours less than potential hours
 - (1) T.I. hour utilization
 - (2) T.I. procedures
 - (a) Inspections may not be complete
 - (b) T.I. did not find all third echelon deficiencies in initial inspection. Need for additional parts later
 - (c) Check vehicle history for high frequency repair of same or other third echelon deficiencies

2. T.I.

- a. Lack of technical training
- b. Cannot use library correctly
 - (1) Identify manuals
 - (2) Order manuals
 - (3) Utilize manuals
- c. Library completeness

2.

- a. Compare T.I. actual hours to T.I. potential hours. See 1 above.
- b. Wrong part ordered? Manuals up-to-date?
- c. T.I. library have all necessary troubleshooting and parts documents?

2.

- a. Needs training
- b. Needs to update library

Standard not exceeded, check for potential problems:

Check Work Flow Analysis, Form C, column I, or Data Collection Form A for shop clerk load and types of vehicles. Check Data Collection Form A for T.I. load and inspection hours.

Cross Reference: Activity Blocks 1,2, and 2A for specific duties.

II. Primary Measure: Date Received to Date Parts Ordered
 Standard: 2 days
 Source: 2407 or 2045

<u>Reason Standard Was Exceeded</u>	<u>Check Reason, Additional Data Sources</u>	<u>Possible Actions</u>
1. Shop Supply element	1.	1. Maintenance control section could increase workday
a. Element workload extremely heavy and task requirements not being met on time	a. Check number of jobs received and number of jobs awaiting parts	a. Augment section
b. Element lacks technical ability and cannot meet task requirements	b. Not keeping record of demand and not computing needed stockage correctly	b. Look at MOS and training of element personnel
2. T.I. element	2. Analysis Form B for additional parts	2. Needs training
a. Parts descriptions not correct and 2407-1 being sent back to the T.I.		
3. Shop Clerk		
a. Not completing and forwarding paperwork in timely manner		

Standard not exceeded, check for potential problems: Check Data Collection Form B for potential shop supply element problems. Check Form B for stockage and DX potential problems. Check T.I. filed 2404s for returned vehicles and potential problems in T.I. element.

Cross Reference: Activity Block 2A, #2-6

III. Primary Measure: Date Parts Ordered to Date Parts Received
 Standard: Approximately 3-10 Days (Except Valid Due In Status)
 Source: 2064

<u>Reason Standard Was Exceeded</u>	<u>Check Reason, Additional Data Sources</u>	<u>Possible Actions</u>
1. Shop Supply element	1.	1.
a. Not performing required tasks on a timely basis	a. Long turnaround time could be due to not keeping stock up. Check 2407 and 3318 for time between part issued date and part reorder date to see if it is lengthy.	a. Maintenance control section may have to augment section or review internal administration or increase workday periodically.
(1) not reordering/stock low	b. Look at time from part ordered date to see if it is lengthy.	b. Look at MOS and training of element personnel.
(2) not requesting, posting, or monitoring status	c. Is clerk keeping a Demand Record for parts from 3318? Adequate Demand Record reduces ordered to received parts time.	
(3) not keeping Demand Record or Stocking from Demand	d. On 2405 and 2404, the time between DX request pull date to DXed date can be calculated.	
(4) takes excessive time to DX component at GS/Tech Supply	e. Compare requisition date, status date, type of status, follow-up date to determine if parts on requisition are being properly monitored.	
b. Element lacks technical ability and cannot meet task requirement.		
c. Internal administration inadequate. Element not working in a logical task sequence.		
2. Maintenance Control Sergeant	2.	2.
a. Not coordinating Shop Supply, Maintenance Control Section, and Automotive Maintenance Section to pull, clean, and crate component for DX.	On 2405 and 2402, the time between DX request date to DXed date can be calculated.	Needs to improve work flow techniques.

Standard not exceeded, check Check Form B for potential supply problems.
 for potential problems:

Cross Reference: Activity Block 3

IV. Primary Measure: Waiting Shop to Time in Shop
 Standard: 1 day
 Source: 2407-1 or Daily Deadline Report

<u>Reasons Standard Was Exceeded</u>	<u>Check Reason, Additional Data Sources</u>	<u>Possible Actions</u>
1. Section Chief/Automotive foreman of Automotive section	1. Check actual and potential manhours. Average maintenance hours versus technical standard. Identification of training and non-training time. High frequency of additional parts for repair.	1. Contact teams to offset limited space
a. Not using manpower efficiently		
2. Mechanical maintenance personnel lack technical ability to various degrees in specific areas.	2. <ul style="list-style-type: none"> a. Manpower utilization b. Available resources and facilities c. Automotive maintenance procedures. d. Average maintenance hours versus average technical standard 	2. Need training for mechanics
3. Shop Officer/Maintenance Control Sergeant (Production Control)	3. Check large number of low grade personnel, minimal experience, lack of middle management NCOs, E-5 and E-6	3. Need to analyze current production control system. Revamp SOPs.
a. Not reallocating personnel and equipment to meet existing limitations		
b. Recognize need to utilize available technical assistance		
c. Utilization of outside equipment or organizational maintenance D.S. capabilities to meet heavy work load or existing backlog.		

Standard not exceeded, check for potential problems: Check Work Flow Analysis Form C for production control.

Cross Reference: Activity Block 4

V. Primary Measure: Time In Shop to Out of Shop
 Standard: Job Specific
 Source: 2405

<u>Reasons Standard Was Exceeded</u>	<u>Check Reason, Additional Data Sources</u>	<u>Possible Actions</u>
1. Mechanical Maintenance Section Chief/ Automotive Foreman	1.	1.
a. not making adequate use of personnel	a. Manpower utilization	a. Needs training.
b. not having adequate internal production control system (equipment, not adequate in-process and in-house final inspections)	b. Technical standard versus actual job manhours	b. Bring library up-to-date.
c. Not using timely technical assistance	c. Library completeness and availability of technical manuals	c. Revise production control system.
d. Inadequate training program to meet technical and personnel limitations	d. Check calibration equipment	
e. Not maintaining, updating job essential resources		
2. Track Mechanic/Automotive Repairman/ Team Supervisor	2. a. Average job repair time vs technical standard	2. Mechanics and repairmen need training.
a. Lack technical ability	b. Authorized vs actual manpower loading	
b. Improper supervision	c. Training vs non-training time	
	d. Task rotation	
	e. Check number of rejection slips	

Standard not exceeded, check Check Workflow Analysis Form C and Training and Manpower Analysis Form D for potential problems: manpower loading and training needs.

Cross Reference: Activity Blocks 5, 6, 7, 8, and 9

VI. Primary Measure: Out of Shop to Final Inspection
Standard: 1 day
Source: 2405 versus 2407

<u>Reasons Standard Was Exceeded</u>	<u>Check Reason, Additional Data Sources</u>	<u>Possible Actions</u>
1. T.I. a. not processing paperwork b. not inspecting vehicle immediately	1. Inspection failure that prevents T.I. element from forwarding 2407 to shop office	1. Needs training for mech maintenance supervisor and mechanics.
2. Shop Officer a. T.I. has backlog and cannot get to vehicle.	2. Reference number 1 on page I for check on T.I.	2. Reference 1 on page I for actions on T.I.

Standard not exceeded, check Check filed 2404s for potential problems.
for potential problems:

Cross Reference: Activity Blocks 10, 10A, and 11.

VII. Primary Measure: Final inspection to pick up by unit
Standard: 1 day
Source: 2407

<u>Reason Standard Was Exceeded</u>	<u>Check Reason, Additional Data Sources</u>	<u>Possible Actions</u>
1. Shop Office Clerk		
a. not processing paperwork		
b. not notifying unit		
2. Unit Personnel		
a. not picking up vehicle	2. Look at vehicle history to determine why unit refuses to accept job.	a. T.I. needs training.
		b. Automotive Section needs training.

Cross Reference: Activity Block 11

APPENDIX F

WORK MEASUREMENT AND ANALYSIS SYSTEM/ARTEP COMPARISON

ACTIVITY BLOCK	DUTY POSITION/MOS/TASKS	MEASURES	SOURCE
1. Process Incoming Jobs	<p>Maintenance Control Sergeant 63H40</p> <ol style="list-style-type: none"> 1. Monitor shop office clerk for proper operation, e.g., up-to-date posting of tub file, production control board and correct entries on 2405. 2. Monitor types of jobs to identify technical difficulties, e.g., high number of 113A1 engines failing. Would require an investigation by Maintenance Control Section. <p>Shop Office Clerk 76L10</p> <ol style="list-style-type: none"> 1. Receives 2407 Form 2. Checks accuracy of 2407 Form 3. Checks for authorized signature 4. Initials top right corner if properly filled out 5. Sends customer to appropriate section 	<p>Primary Measure</p> <p>Date Submitted - Date Received (1 day)</p> <ol style="list-style-type: none"> 1. A greater elapse of time could be due to production control not monitoring T.I. element to assure proper staffing to meet workload and assure proper internal procedures. 2. T.I. element could lack necessary technical ability. 	2407
2. Perform Technical Inspection	<p>Maintenance Control Sergeant 63H40</p> <ol style="list-style-type: none"> 1. Monitor T.I. element to: <ol style="list-style-type: none"> (a) assure adequate staffing to meet workload (b) provide adequate quality check on organizational maintenance and to effectively respond to inadequate maintenance on the part of those units. (c) assure proper organization and functioning. <ol style="list-style-type: none"> (1) correct T.I. procedures (2) complete files (3) adequate library (d) assure technical proficiency of T.I. element (e) identify training needs <p>Technical Inspector 63H30</p> <ol style="list-style-type: none"> 1. Checks organization level diagnosis 2. Checks to see that the first and second echelon deficiencies are worked off 3. Checks for third echelon deficiencies 4. Accepts or rejects vehicles based on number of points from deficiencies 5. When T.I. rejects vehicle, he notifies shop clerk who closes out shop order and annotates rejection on 2404 6. Files a copy of 2404 by unit 7. When T.I. accepts vehicle he fills out 2407-1 (appropriate information needed to order parts) 8. Maintains Update Reference Library 	<p>Additional Measures</p> <ol style="list-style-type: none"> 1. Comparison of T.I. actual and potential hours for evaluation of: <ol style="list-style-type: none"> (a) potential problems needed to be addressed by MCS (b) T.I. technical ability (c) T.I. element administration procedures. 2. Vehicle History - high frequency of returned vehicles for same problem or other 3rd echelon deficiencies with 30 days - evaluation of T.I. technical ability difficulties. 3. High frequency of additional parts ordered or obtained at control point - evaluation of T.I. technical ability. 4. Frequent discrepancy between 2407-1 and microfilm review by shop supply clerk - evaluation of T.I. technical ability. 	<p>2407 Kinton Form</p> <p>2404 Kinton Form</p> <p>2407-1 Kinton Form Column 2</p> <p>Kinton Form (notation by Supply Clerk)</p>
2.A. Vehicle Accepted?	<p>Shop Clerk 76L10</p> <ol style="list-style-type: none"> 1. Receives 2407 back from T.I. Signed in block 24. 2. Logs in Job Order Number on 2405. Special attention is given to Serial Number and Administrative Number (bumper number). 3. Gives customer the number one receipt copy of 2407. Logs in Job Order Number on 2407. 4. Construct Job order package. Necessary entries are: Owning Unit, Job Order Number, Date Accepted, Bumper Number and Type of Equipment. 5. Move and post control tab to PC Board. 6. Identifying tag to Equipment Logbook. 7. When parts have been ordered and packet returned to Job Order Records Section, place the entire packet in tub file under the appropriate status. If necessary move control tag on PC Board. 	<p>Inability to provide complete information on Kinton data forms will indicate a need for more efficient administrative procedures within the shop office.</p>	<p>2407 2405 Daily Status Kinton Form</p>

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MEASURES	SOURCE	ARTEP TASK	ARTEP STANDARD
<p>1. Date Received (1 day) Elapse of time could be due to control not monitoring T.I. 2. assure proper staffing to meet and assure proper internal 3. Unit could lack necessary technical</p>	2407	5.5 Maintain Production Control System	1. Records and files must be maintained IAW ARs, TMs, Directives and SOPs.
<p>Measures 1. of T.I. actual and potential reevaluation of initial problems needed to be assessed by MCC 2. technical ability 3. element administration procedures 4. history - high frequency of vehicles for same problem or ... and deficiencies with 30 days - evaluation technical ability difficulties frequency of additional parts ordered at control point - evaluation of technical ability. discrepancy between 2407-1 and review by shop supply clerk - 5. of T.I. technical ability</p>	<p>2407 Nintan Form C</p> <p>2404 Nintan Form E</p> <p>2407-1 Nintan Form A Column 2</p> <p>Nintan Form D (notation by Shop Supply Clerk)</p>	<p>6.1 Inspect Equipment</p> <p>6.3 Provide Quality Control and Assurance</p> <p>6.4 Maintain Library</p>	<p>1. Inspection deficiencies are documented on appropriate forms (DA Forms 2404 and 2408 series) and recorded IAW TM 38-750.</p> <p>1. Inspection results are entered on DA form 2404 including ASH of required repair parts IAW TM 38-750.</p> <p>1. Library must be maintained in accordance with pertinent AR and DA PAH. 2. DA Form 12 series must be accurate and up-to-date. 3. Library should include information on all items which the unit might receive for all inspection and/or disassembly.</p>
<p>provide complete information on forms will indicate a need for ... administrative procedures within the</p>	<p>2407 2404 Daily Status Report Nintan Form A</p>	5.5 Maintain Production Control System	<p>1. Records and files must be maintained IAW ARs, TMs, directives, and SOPs. 2. Unit must maintain an accurate work request register reflecting shop status of equipment 3. Unit must maintain accurate production control system which identifies exact location of all equipment and work requests.</p>

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ACTIVITY BLOCK	DUTY POSITION/MOS/TASKS	MEASURES	SOURCE
3.0 Monitor Shop Supply	Maintenance Control Sergeant 63H40	Primary Measure Date Received - Date Parts are Ordered (1 day) A greater elapse of time could indicate a need for Maintenance Control Sergeant to: 1. Monitor and supervise shop supply operation in terms of: (a) maintaining adequate demand supported stock (b) proper and timely requisition procedures 2. Evaluate technical ability of shop supply element personnel. 3. Monitor interface between supply element and automotive section to facilitate DX process 4. Determine if T.I. element frequently provides inaccurate parts description on 2407-1.	2407-2064 Kinton Form
3.1 Parts on Hand?	Shop Supply Clerk 76D10	Additional Measures To evaluate technical ability and/or poor administration of shop supply element and possible inadequate production control by Maintenance Control Section, e.g., workload exceeds capabilities of shop supply element as currently staffed. 1. Difference between part issue date and reorder date exceeds standard. 2. Difference between Job Order Date and Document Register Date exceeds standard 3. Difference between DX date and request for DX pull exceeds reasonable time standard.	2407-1 Kinton Form 2407-1 3318 2064 Kinton Form
3.2 Reorder as Required	Shop Supply Clerk 76D10		2064 2405 Kinton Form 2407-1 2402 Kinton Form
3.2, 3.4, 3.5 DX Item DX Available Initiate DX Pull	Shop Supply Clerk 76D10		
3.5 Pull DX Component	Automotive Repairman Truck Vehicle Mechanic Wheel Vehicle Mechanic 63H10 63C10 63B10	Primary Measure Date Parts Ordered - Date Parts are Received High MOS time requires Maintenance Control Section to evaluate: (1) staffing for supply element (MOS, number of personnel and training background) (2) technical ability of element. Shop supply (administrative operation).	2064 2407-1 Kinton Form
3.6 DX Component	Shop Supply Clerk 76D10	Additional Measures 1. Comparison of DX date, component pull, and request for DX pull to determine if reasonable time is exceeded. 2. Comparison of requisition date to date status is received (type of status) to determine if parts on requisition are being properly monitored.	2405 (Mech) 2402 2064 Kinton Form 2064 Kinton Form
3.7 Order Parts	Shop Supply Clerk 76D10		
3.9 Update Status	Shop Supply Clerk 76D10		

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DESCRIPTION	SOURCE	ARTEP TASK	ARTEP STANDARD
<p>are Ordered (1 day) ould indicate a need equent to: shop supply operation</p> <p>ate demand supported</p> <p>requisition procedures ity of shop supply</p> <p>en supply element and facilitate DX process nt frequently provides ption on 2407-1.</p> <p>ty and/or poor adminis- ent and possible ol by Maintenance rked exceeds capabilities currently staffed. Issue date and standard. Order Date and Document Standard ate and request for ble time standard.</p> <p>BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DDG</p> <p>Parts are Received Maintenance Control Section</p> <p>ement (HQS, number ing background) ement. Shop supply ion).</p> <p>component pull, l to determine if needed. on date to date e of status) to requisition are ed.</p>	2407-2064 Kinton Form A	5.11 Maintain Shop Stock	<ol style="list-style-type: none"> 1. Determine the supply source. 2. Determine if part is on hand. If so, issue from that stock. 4. Maintain a demand supported shop stock. 6. IAW AR 710-2 and locally implemented automated supply procedures. 10% of on-hand stockage is sampled and 90 of these are correctly maintained.
	2407-1 Kinton Form D	5.11 Maintain Shop Stock	<ol style="list-style-type: none"> 4. Maintain a demand support shop stock. 5. Provide bench stock to maintenance shops. 6. IAW AR 710-2 and locally implemented automated supply procedures. 10% of on-hand stockage is sampled and 90 of these are correctly maintained.
	2407-1 3318 2064 Kinton Form D		
	2064 2405 Kinton Form A		
	2407-1 2402 Kinton Form D	5.11 Maintain Shop Stock	<ol style="list-style-type: none"> 1. Determine the supply source. 2. Determine if part is on hand. If so, issue from that stock. 3. If part is not available, requisition from supporting supply activity using procedures outlined in SFP and/or appropriate automated system.
		5.11 Maintain Shop Stock	<ol style="list-style-type: none"> 3. If part is not available, requisition from supporting supply activity using procedures outlined in SFP and/or appropriate automated system.
	2064 2407-1 Kinton Form A	5.11 Maintain Shop Stock	<ol style="list-style-type: none"> 3. If part is not available, requisition from supporting supply activity using procedures outlined in SFP and/or appropriate automated system.
	2405 (Mech) 2402 2064 Kinton Form D	5.11 Maintain Shop Stock	<ol style="list-style-type: none"> 3. If part is not available, requisition from supporting supply activity using procedures outlined in SFP and/or appropriate automated system.
	2064 Kinton Form A		
		5.11 Maintain Shop Stock	<ol style="list-style-type: none"> 3. If part is not available, requisition from supporting supply activity using procedures outlined in SFP and/or appropriate automated system.
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ACTIVITY BLOCK	DUTY POSITION/MOS/TASKS	MEASURES
3.10 Request Status	Shop Supply Clerk 76D10 1. If part or status is not received after appropriate time frame, request follow up (AFI).	Comparison of Parts Order Date
3.11 Process Parts for Waiting Shop	Shop Supply Clerk 76D10 1. When part comes in make appropriate entries on 2064. Enter quantity due in, quantity received. Julian date for parts in, Job Order number or bumper number. 2. Fill out 2407-1. Circle part number on form when part comes in. Get signature from mech maintenance before issuing part. Put parts in proper bin. 3. Demand is recorded on 3318 and current stockage is notated.	
4.0 Process Work to Shop	Maintenance Control Sergeant 63H40 1. Prioritize work to Automotive Section. 2. Monitor work flow to Automotive Section to assure a backlog does not occur. 3. Adjust production control system to alleviate any backlog. 4. Monitor Automotive Section to assure adequacy of in-shop procedures, adequate manpower utilization, e.g., section working at capacity. Shop Office Clerk 76D10 1. When Job Packet is returned, it is filed in tub file as Waiting Parts, Waiting Shop, or In Shop. 2. Updates tub file. 3. Advises Maintenance Control Section of tub file status. 4. When an item of equipment changes status to Waiting Shop the following procedures apply: (a) Remove the white control copy of DA Form 2407 from the job order packet and place it in the box of the Section that will accomplish the work. (b) Move the job order packet and the control tag on the PC board to Waiting Shop status (c) The Section representative picks up the paper work.	Primary Measures Waiting Shop to In Shop (1 day) Exceeding this standard can indicate a need for Maintenance Control Section to analyze: 1. adequacy of production control section 2. current manpower utilization 3. current utilization of equipment resources 4. adequacy of automotive maintenance procedures 5. technical ability of mech maintenance section. Additional Measures 1. Comparison of available manhours and actual manhours 2. Percent of utilization 3. Comparison of mean maintenance hours and mean technical standard for jobs 4. Identification of training hours. 5. High frequency of additional parts needed.

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RES	SOURCE	ARTEP TASK	ARTEP STANDARDS
	2064 Kinton Form A	5.1 Maintain Shop Stock	3. If part is not available, requisition from supporting supply activity using procedures outlined in SOP and/or appropriate automated system.
		5.5 Maintain Production Control System	4. Units must maintain accurate production control system which identifies exact location of all equipment and work requests.
<p>(1 day)</p> <p>and can indicate a Control Section to analyze: production control section utilization</p> <p>on of equipment resources</p> <p>ective maintenance</p> <p>of mech maintenance</p> <p>available manhours and actual</p> <p>zation</p> <p>on maintenance hours and standard for jobs.</p> <p>training hours.</p> <p>additional parts needed</p>	<p>2064 2405 Kinton Form A</p> <p>Kinton Forms A and B Measurement and Manhour Analysis Form</p> <p>Analysis of technical ability of T.I. element applied to Activity Block 2. However, can contribute to a backlog (or overload) which affects this primary measure.</p>	5.5 Maintain Production Control System	<ol style="list-style-type: none"> 1. Records and files must be maintained IAW ARs, TMs, Directives, and SOPs. 2. Reports must accurately reflect production status/information as required by higher headquarters. 3. Unit must maintain an accurate work register reflecting shop status of equipment 4. Units must maintain accurate production control system which identifies exact location of all equipment and work requests. 5. Unit Commander appraised of maintenance situation daily as required.

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ACTIVITY BLOCK	WORK FLOW PROCESS		
	DUTY POSITION/MOS/TASKS	MEASURE	SOURCE
5. Process Incoming Job	Maintenance Section Chief 63H40 1. Effective manpower utilization 2. Organize sections into work teams. Done from task rotation records 3. Log job in on 2405 4. Make up packet, 2407 and 2404 5. Assign job to a team 6. Assure proper training and cross training of mechanics 7. Report status of jobs in process to Maintenance Control Section. Immediately notify Section of difficulties.	Primary Measure Time in Shop - Out of Shop Excess delay could be due to Mechanical Maintenance Section Chief not making adequate use of available personnel or not having an adequate internal production control system. 1. Not making good use of available equipment. 2. Not providing adequate in-process and final inspections. 3. Not using timely technical assistance. 4. Library incomplete. 5. Inadequate technical ability in Automotive Section. 6. Lack of good training program to meet technical limitations and personnel limitations. 7. Frequent need of additional parts. Indication of T.I. ability can contribute a delay here. (a) Additional parts must be verified by Automotive Repair Foreman and T.I. (b) Parts are ordered by T.I. 8. Ineffective work teams (a) Inadequate mix of inexperienced and experienced personnel. (b) No one responsible for job. 9. Inability to track personnel abilities and to identify training needs.	2405 (MCS) 2405 (Mechanical Maint)
7.0 Repair Tracked Vehicles	Track Vehicle Repairman 63C10, 63H10, 63H20 1. Perform automotive repair on tracked vehicles.	Additional Measures 1. Manpower utilization 2. Deviation from technical standard 3. Training/non-training time 4. GO/NO GO task performance 5. Task rotation 6. Job rejection 7. Vehicle history	Training and Manhour A Kinton Forms A, B and 2407 2404/Soldier's Job Gu DA 829 2404/Supervisor Inspe
7.1 Supervise Repair of Tracked Vehicles	Automotive Repair Foreman 63H40 1. Supervise automotive repairmen in the repair of track vehicles. 2. Provide in-process inspection. 3. Inspect and perform operational check of completed repairs. 4. Record GO/NO GO on job and hours of each individual. 5. Submit job packet to section chief. 6. Instruct and demonstrate proper repair and replacement procedures to lower skilled personnel.	Mechanic could exceed standard: 1. Lack of complete technical ability on some tasks 2. Not trained on adequate number of CJT tasks 3. Repair of infrequent tasks 4. Skill deterioration 5. Additional parts needed	Additional Parts used Evaluation of T.I. 2407 Kinton Forms A and B Training and Manhour 2404/Soldier's Job Gu DA 829 2404/Supervisor Inspe
7.2 Assist in Supervising Repair of Tracked Vehicles	Assistant Automotive Repair Foreman/Mobile Maintenance Team Leader 63H30 1. In charge of Mobile Maintenance Team (contact team). Responsibilities include troubleshoot and supervise inspection and repair of wheel and track equipment. 2. Assist or perform duties of automotive foreman. (a) Assist or supervise work teams. (b) Assist or perform in-process inspections. (c) Assist or inspect and perform operational checks of repaired vehicles. (d) Assist or rate mechanic on GO/NO GO on task performance. (e) Submit job packet to Section Chief. (f) Assist in or instruct and demonstrate proper repair and replacement procedures to lower skilled personnel		

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	SOURCE	ARTEP TASK	ARTEP STANDARD
Maintenance available final ment. final e. otive technical indication y here. ed by I. and es and	2405 (HCU) 2405 (Mechanical Maintenance)	7.2 Submit Workload Status by Section	1. Each platoon/section must submit complete, accurate, up-to-date status report on all jobs on hand in the platoon/section to the Maintenance Control Section as required.
		7.7 Supervise TAWMs and supply requirements	1. The team/section chief will insure proper preparation, maintenance and disposition of records IAW TM 38-750. 2. Insure that repair parts supplies are available in sufficient quantity, and that adequate control procedures are maintained.
	Training and Manhour Analysis Form Kinton Forms A, B and E 2407 2404/Soldier's Job Guide DA 829 2404/Supervisor Inspection Job Guide	8.5 Repair Tracked Vehicles	2. Necessary tools, hoist equipment and/or repair parts are acquired. 3. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel. 4. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards.
		8.5 Repair Tracked Vehicles	1. DA Forms 2404/2407 are reviewed to determine required repairs. 2. Necessary tools, hoist equipment and/or repair parts are acquired. 3. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel. 4. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards. 5. Completion of work must be verified. 6. DA Forms 2404/2407 and associated TAWMS forms are completed IAW TM 38-750. 8. Repaired item must be sent to final inspection.
	Additional Parts used for Evaluation of T.I. 2407 Kinton Forms A and B Training and Manhour Analysis Form 2404/Soldier's Job Guide DA 829 2404/Supervisor Inspection Job Guide	9.5 Repair Tracked Vehicles	1. DA Forms 2404/2407 are reviewed to determine required repairs. 2. Necessary tools, hoist equipment and/or repair parts are acquired. 3. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel. 4. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards. 5. Completion of work must be verified. 6. DA Form 2404/2407 and associated TAWMS forms are completed IAW TM 38-750. 8. Repaired item must be sent to final inspection.

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ACTIVITY BLOCK	WORK FLOW PROCESS		
	DUTY POSITION/MOS/TASKS	MEASURE	SOURCE
8.0 Repair Wheeled Vehicles	<p>Wheel Vehicle Repairman 63H10, 63H20, 63B10</p> <ol style="list-style-type: none"> 1. Perform automotive repair on wheeled vehicle 	<p>Additional Measures</p> <ol style="list-style-type: none"> 1. Manpower utilization 2. Deviation from technical standard 3. Training/non-training time 4. GO/NO GO task performance 5. Task rotation 6. Job rejection 7. Vehicle history <p>Mechanic could exceed standard:</p> <ol style="list-style-type: none"> 1. Lack of complete technical ability on some tasks 2. Not trained on adequate number of OJT tasks 3. Repair of infrequent tasks 4. Skill deterioration 5. Additional parts needed 	<p>Training and Manpower Analysis Form Kinton Forms A, L and E 2407 2404/Soldier's Job Guide DA 829 2404/Supervisor Inspection Job Guide</p>
8.1 Supervise Repair of Wheeled Vehicles	<p>Automotive Repair Foreman 63H40</p> <ol style="list-style-type: none"> 1. Supervise automotive repairmen in the repair of track vehicles 2. Provide in-process inspection. 3. Inspect and perform operational check of completed repairs. 4. Record GO/NO GO on job and hours of each individual. 5. Submit job packet to section chief. 6. Instruct and demonstrate proper repair and replacement procedures to lower skilled personnel. 		
8.2 Assist in Supervising Repair of Wheeled Vehicles	<p>Assistant Automotive Repair Foreman/Mobile Maintenance Team Leader 63H30</p> <ol style="list-style-type: none"> 1. In charge of Mobile Maintenance Team (contact team). Responsibilities include troubleshoot and supervise inspection and repair of wheel and track equipment. 2. Assist or perform duties of automotive foreman. <ol style="list-style-type: none"> (a) Assist or supervise work teams. (b) Assist or perform in-process inspections. (c) Assist in inspect and perform operational checks of repaired vehicles. (d) Assist or rate mechanics on GO/NO GO on task performance. (e) Submit job packet to Section Chief. (f) Assist in or instruct and demonstrate proper repair and replacement procedures to lower skilled personnel. 	<p>THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DDG</p>	
9. Process Outgoing Jobs	<p>Section Chief 63H40</p> <ol style="list-style-type: none"> 1. Section Chief completes entries on 2405. His signature accepts job packet. 2. Review and file job packet (control copy of 2407 and 2404). 3. Attaches DA 829 if job rejected at final inspection. 4. Update job file guide (task rotation and task performance). 5. On 2405, record In Shop Date, Job Completion Date, Job Number, Vehicle Type, Bumper Number, Organization, Number of Personnel on Job, and Manhours. 6. Identifies training needs. 	<ol style="list-style-type: none"> 1. Task rotation/cross training system in use? 2. Training program responsive to any technical difficulties associated with task performance (team and individual)? 	<p>2404 2405 (Mechanical Maintenance) 2407 Soldier's Job Guide</p>

MEASURE	SOURCE	ARTEP TASK	ARTEP STANDARD
<p>Measures</p> <p>Utilization</p> <p>From technical standard</p> <p>Non-training time</p> <p>Task performance</p> <p>Station</p> <p>Section</p> <p>History</p> <p>Did exceed standard:</p> <p>Complete technical ability</p> <p>Tasks</p> <p>On adequate number of</p> <p>Of infrequent tasks</p> <p>Deterioration</p> <p>al parts needed</p>	<p>Training and Manpower Analysis Form</p> <p>Kinton Forms A, B and E</p> <p>2407</p> <p>2404/Soldier's Job Guide</p> <p>DA 829</p> <p>2404/Supervisor Inspection Job Guide</p>	<p>8.6 Repair Wheel Equipment</p>	<p>2. Necessary tools, hoist equipment and/or repair parts are acquired.</p> <p>3. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel.</p> <p>4. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards.</p>
<p>THIS PAGE IS BEST QUALITY PRACTICABLE</p> <p>FROM COPY FURNISHED TO DDG</p>		8.6 Repair Wheel Equipment	<p>1. DA Forms 2404/2407 are reviewed to determine required repairs.</p> <p>2. Necessary tools, hoist equipment and/or repair parts are acquired.</p> <p>3. Proper security measures are initiated while job is under maintenance activity control.</p> <p>4. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel.</p> <p>5. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards.</p> <p>6. Completion of work must be verified.</p> <p>7. DA Forms 2404/2407 and associated TAMMS forms are completed IAW TM 38-750.</p> <p>9. Repaired item must be sent to final inspection.</p>
		8.6 Repair Wheel Equipment	<p>1. DA forms 2404/2407 are reviewed to determine required repairs.</p> <p>2. Necessary tools, hoist equipment and/or repair parts are acquired.</p> <p>3. Proper security measures are initiated while job is under maintenance activity control.</p> <p>4. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel.</p> <p>5. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards.</p> <p>6. Completion of work must be verified.</p> <p>7. DA Forms 2404/2407 and associated TAMMS forms are completed IAW TM 38-750.</p> <p>9. Repaired item must be sent to final inspection.</p>
		7.2 Submit Workload Status by Section	<p>1. Each platoon/section must submit complete, accurate, up-to-date status report on all jobs on hand in the Platoon Section to the Maintenance Control Section as required.</p>
<p>Rotation/cross training</p> <p>Item in use?</p> <p>Training program responsive</p> <p>Any technical difficulties</p> <p>Associated with task performance</p> <p>Team and individual)?</p>	<p>2404</p> <p>2405 (Mechanical Maintenance)</p> <p>2407</p> <p>Soldier's Job Guide</p>	<p>7.7 Supervise TAMMS and Supply requirements</p>	<p>1. The team chief will insure proper preparation, maintenance and disposition of records IAW TM 38-750.</p>

WORK FLOW PROCESS

ACTIVITY BLOCK	DUTY POSITION/MOS/TASKS	MEASURES	SOURCE
<p>10 Perform Final Inspection</p>	<p>Technical Inspector 63H30</p> <ol style="list-style-type: none"> 1. Performs final inspection upon completion of work to verify quality and completeness of job. 2. Inspects vehicle to assure vehicle is in same condition as when originally inspected. 3. Fills out two copies of the Rejection Memo, Form 829, when vehicle is rejected. 4. Files one copy of 829. 5. Attaches one copy of 829 to 2407 control copy. 6. Signs 2407 and forwards it to shop office if vehicle passes inspection. <p>THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DDG</p>	<p>Out of Shop - Final Inspection</p> <p>Excess delay can be due to:</p> <ol style="list-style-type: none"> 1. Inadequate staffing of T.I. element. 2. Inadequate operating procedures of T.I. element 3. Inspection failure which prevents T.I. element from forwarding 2407 to Shop Clerk. Job must be reopened. 4. Lack of technical ability within T.I. element. <p>Additional Measures</p> <ol style="list-style-type: none"> 1. Rejection slips issued by T.I. Reason for rejection: (a) inadequate repair (b) component failure 2. Analysis of manpower utilization within T.I. element. 3. Vehicle history. High frequency of returned vehicles for some problem or other. Third echelon deficiencies within 30 days. 	<p>2407 2404 DA 829 Kinton Forms C and E</p>
<p>11 Process Completed Job Order</p>	<p>Shop Office Clerk 76D10</p> <ol style="list-style-type: none"> 1. Post all information on white copy to basic DA Form 2407. Entries should include information in blocks 17a., b., c., 18, 20 (as required), 25, 26 and 28 (with appropriate entry). 2. NORS/NORM time will be computed and entered in block 33. 3. Post information to DA Form 2405 as follows: date started, date completed, and manhours. 4. Post Serial Number of new assemblies to log book DA Form 1408-10. 5. Move tag on PC board to Waiting Pick-up. 6. Place completed job order packet in appropriate Unit Pick-up box. 7. Notify unit. 8. Units having items to pick up should be notified twice daily until item is picked up. If item waits for more than two work days notify HCGIC of Shop Office. 9. The authorized Unit representative will present a hand receipt (green copy) for the equipment. 10. The representative will sign and date block 27 of the DA Form 2407. 11. Copy #4 (blue) will be removed from DA Form 2407 and 2407-1. 12. Log book will be removed and returned to the customer. 13. Tag will be removed from PC board. 14. Dated entry will be made on 2405 in column headed Parts. 15. No. 2 copy of DA Form 2407 and DA Form 2407-1 will be detached and fastened together and placed in box for BMO. 16. If work request is completed, No. 5 hard copy of DA Form 2407 and DA Form 2407-1 and 2404 will be fastened together and placed in box marked cleared. 17. Maintains, updates, and files Daily Deadline Report for 90 days. 	<p>Primary Measure</p> <p>Final Inspection - Pick-up by Unit</p> <ol style="list-style-type: none"> 1. Delay could be result of Shop Office not being adequately staffed or properly organized to process paper work and notify organizational unit on a timely basis. 2. Organization refusal to accept completed job. This could indicate a problem at T.I. element, Automotive Section, or both. <p>Additional Measures</p> <ol style="list-style-type: none"> 1. Vehicle history. High frequency of returned vehicles for some problem or other. Third echelon deficiencies within 30 days. 	<p>2407 Kinton Form E</p>

SOURCES	SOURCE	ARTEP TASK	ARTEP STANDARD
<p>Inspection due to: Timing of T.I. Timing procedures are which prevents from forwarding work. Job must be availability within</p> <p>issued by T.I. action: repair failure power utilization ment. High frequency cycles for some r. Third echelon thin 30 days.</p>	<p>2407 2404 DA 829 Kinton Forms C and E</p>	<p>6.1 Inspect Equipment</p> <p>6.3 Perform Quality Control and Assurance</p>	<p>4. After repairs have been completed by the applicable repair section, a final inspection is completed to verify equipment is fully operational.</p> <p>1. Insure the adequacy of maintenance and the use of proper techniques and procedures. 2. Insure all maintenance requested has been accomplished IAW applicable publications. 3. Inspection deficiencies are documented on appropriate forms (DA Forms 2404 and 2408 series) and recorded IAW TM 38-750.</p> <p>THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO DDO</p>
<p>pick-up by Unit suit of Shop Office ely staffed or properly ess paper work and onal unit on a timely</p> <p>sal to accept completed indicate a problem at omotive Section,</p> <p>High rned vehicles for other. iciencies</p>	<p>2407 Kinton Form E</p>	<p>5.5 Maintain Production Control System</p>	<p>1. Records and files must be maintained IAW APs, IMs, directives, and SOPs. 2. Reports must accurately reflect production status/information as required by higher HQ. 3. Unit must maintain an accurate work request register reflecting shop status of equipment. 4. Unit must maintain accurate production control system which identifies exact location of all equipment and work requests. 5. Unit commander appraised of maintenance situation daily or as required.</p>

APPENDIX G
ARTEP CONSOLIDATED TASK LIST AND TASK EXCERPTS

ARTEP
CONSOLIDATED TASK LIST

TASK NO	TASK	Company HQ	MCS	Sup Plt	Svc-Rcvy Plt	Elec Plt	Mech Maint Plt
1	<u>PROVIDE COMMAND AND CONTROL</u>						
1-2	Analyze the mission	X					
1-4	Advise higher headquarters on maintenance situation	X					
1-6	Perform command/liaison visits	X					
1-8	Maintain safety program	X					
2	<u>PROVIDE ADMINISTRATIVE SERVICES</u>						
2-3	Provide administrative support	X					
2-5	Maintain mail service	X					
3	<u>PROVIDE LOGISTICAL SERVICES</u>						
3-1	Provide supply support	X					
3-2	Establish and operate a field mess	X					
3-3	Coordinate non-organic transportation requirements	X					
3-4	Perform organizational/operator maintenance on organic equipment	X					
3-5	Perform preventive maintenance	X					
3-6	Supervise field sanitation	X					
4	<u>CONDUCT TACTICAL OPERATIONS</u>						
4-1	Maintain unit movement plan	X					
4-2	Organize and dispatch advance party	X					
4-3	Perform advance party functions	X					
4-4	Execute the move	X					
4-5	Occupy and establish an operational site	X					
4-6	Conduct rear trail party activity	X					
4-7	Establish wire and radio communications	X					
4-8	Defend against an enemy ground attack	X					
4-9	Perform area damage control (ADC)	X					

ARTEP
CONSOLIDATED TASK LIST

TASK NO	TASK	Company HQ	MCS	Sup Plt	Svc-Rcvy Plt	Elec Plt	Mech Maint Plt
5	<u>PROVIDE MAINTENANCE MANAGEMENT</u>						
* 5-5	Maintain production control system		X				
* 5-8	Maintain liaison with supported and supporting units		X	X			
* 5-9	Dispatch on-site maintenance and recovery/evacuation teams		X				
* 5-11	Maintain shop stock		X				
5-12	Maintain quick service supply items (QSS)	X					
5-13	Maintain prescribed load list (PLL)	X					
5-15	Maintain organizational maintenance records	X					
5-16	Prepare and submit materiel readiness report	X					
* 5-17	Request EOD support		X				
* 5-18	Request NBC support		X				
6	<u>MAINTAIN QUALITY ASSURANCE AND CONTROL</u>						
* 6-1	Inspect equipment		X				
* 6-3	Perform quality control and assurance		X				
* 6-4	Maintain a publications library		X				
7	<u>MAINTAIN PLATOON/SECTION CONTROL</u>						
* 7-1	Maintain shop safety program and procedures		X	X			
* 7-2	Submit workload status report by section				X	X	X
* 7-4	Maintain tool and equipment accountability	X	X	X	X	X	X
* 7-5	Maintain communications with maintenance control section (MCS)				X		X
* 7-7	Supervise TAMMS and supply requirements				X		X

*Tasks which apply to 63H MOS in the Maintenance Control Section and Automotive Maintenance Section.

CONSOLIDATED TASK LIST

TASK NO	TASK	Company HQ	MCS	Sup Plt	Svc-Rcvy Plt	Elec Plt	Mech Maint Plt
8	<u>PROVIDE MAINTENANCE SUPPORT SERVICES</u>						
8-1	Repair power generation equipment						X
8-2	Repair engineer equipment						X
8-3	Repair chemical equipment						X
8-4	Repair quartermaster equipment						X
* 8-5	Repair tracked vehicles						X
* 8-6	Repair wheeled equipment						X
* 8-7	Repair fuel and electric equipment						X
8-8	Repair field radios					X	X
8-10	Repair electronic devices					X	
8-11	Repair teletype equipment					X	
8-12	Repair surveillance radars					X	
8-14	Repair tank turret equipment						X
8-15	Repair artillery equipment						X
8-16	Repair fire control instruments						X
8-17	Repair small arms						X
8-22	Repair central office equipment					X	X
8-29	Perform allied trades operations				X		
8-31	Provide hoist capability				X		
8-32	Perform recovery/evacuation operations				X		
8-36	Repair refrigeration equipment						X
8-39	Repair canvas and fabric				X		

*Tasks which apply to 63H MOS in the Maintenance Control Section and Automotive Maintenance Section

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING EVALUATION STANDARDS
5-5	Maintain production control system.	In order to control movement of equipment through the shop, a production control system is necessary. Reports generated by the system are needed by higher HQ to appraise the maintenance situation.	<ol style="list-style-type: none"> 1. Records and files must be maintained IAW ARs, TMs, directives, and SOPs. 2. Reports must accurately reflect production status/information as required by higher HQ. 3. Unit must maintain an accurate work request register reflecting shop status of equipment. 4. Unit must maintain accurate production control system which identifies exact location of all equipment and work requests. 5. Unit commander appraised of maintenance situation daily or as required.
5-8	Maintain liaison with supported and supporting units.	Unit needs to identify/resolve problems with customer units.	<p>Liaison visits are performed on a routine, or as needed basis. Problems and requirements are identified. Solutions are proposed. Follow-up action initiated to insure problems are resolved. Equipment density lists are correlated with customer unit needs. Coordinate with next higher HQ for maintenance assistance.</p> <p>REF: FM 101-5, 2C,39, 29-30-1</p>

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
5-9	Dispatch on-site maintenance teams and recovery/evacuation team.	The unit receives request for assistance from supported unit.	<ol style="list-style-type: none"> 1. The teams are manned and equipped to provide the assistance requested. 2. Parts anticipated for the repairs are drawn from shop stock or tech supply. 3. Teams are briefed by the shop officer/NCO on location of unit and conditions at the site. 4. The team is dispatched by the maintenance control section. 5. All maintenance and supply documentation is returned to the maintenance control section upon the completion of the mission.

REF: FM 29-30-1
RDOM 29-30-1

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
5-11	Maintain shop stock.	DA Form 2404 is received from inspection section or Section receives a request for repair parts for work already in progress.	<ol style="list-style-type: none"> 1. Determine the supply source. 2. Determine if part is on hand. If so, issue that from stock. 3. If part is not available, requisition from supporting supply activity using procedures outlined in SOP and/or appropriate automated system. 4. Maintain a demand supported shop stock. 5. Provide bench stock to maintenance shops. 6. IAW AR 710-2 and locally implemented automated supply procedures, 10% of on-hand stockage is sampled and 90% of these are correctly maintained. <p>REF: FM 29-25, 29-30-1; AR 710-2</p>
5-17	Request EOD support.	Vehicles are known or suspected of being booby-trapped or contain live ammunition. EOD requesting procedures are on hand.	<p>Must be performed prior to handling of suspected equipment or dispatching a maintenance support/recovery team to prevent injury to personnel or damage to equipment.</p> <p>EOD support must be requested IAW supporting DOD Det External SOP.</p> <p>REF: FM 29-30-1</p>

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
5-18	Request NBC support.	Vehicles are known or suspected of being contaminated by NBC agents. Unit has NBC decon requesting procedures on hand	<p>Must be performed prior to handling of suspected equipment or dispatching of maintenance support/recovery teams to prevent NBC injury to personnel or contamination of equipment.</p> <p>NBC support must be requested IAW supporting decontamination unit external SOP or IAW directives from higher HQ.</p> <p>REF: FM 29-30-1</p>
6-1	Inspect equipment.	Section has received DA Form 2407 (Maintenance Request).	<ol style="list-style-type: none"> 1. Item must be properly and accurately identified as to make, model, and/or applicable end item. 2. Information on DA Form 2407 and log forms must be verified for accuracy. 3. Inspection results are entered on DA Form 2404 including NSN of required repair parts IAW TM 38-750. 4. After repairs have been completed by the applicable repair section, a final inspection is completed to verify equipment is fully operational. 5. When operating under automated production control, all associated requirements must be met. <p>REF: TM 38-750; FM 29-30</p>

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
6-3	Perform quality control and assurance.	Section has received equipment and work is progressing. Quality control and assurance must be maintained as required by SOP.	<ol style="list-style-type: none"> 1. Insure the adequacy of maintenance and the use of proper techniques and procedures. 2. Insure all maintenance requested has been accomplished IAW applicable publications. 3. Inspection deficiencies are documented on appropriate forms (DA Forms 2404 and 2408 series) and recorded IAW TM 38-750. 4. In-process inspections are conducted on equipment. <p>REF: TM 38-750; FM 29-30-1</p>
6-4	Maintain a publications library.	The unit is required by AR, local regulations, and SOP to maintain a reference publications library. Manuals are required to adequately inspect and disassemble vehicles.	<ol style="list-style-type: none"> 1. Library must be maintained in accordance with pertinent AR and DA Pam. 2. DA Form 12 series must be accurate and up-to-date. 3. Library should include information on all items which the unit might receive for inspection and/or disassembly. <p>REF: AR 310- series AR 750- series DA Pam 310- series DA Pam 750- series</p>

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
7-1	Maintain shop safety program and procedures.	Observation of poor safety practices and procedures within section.	<p>Programs and procedures must be IAW AR, local regulations, unit SOP, and directives. All unit personnel and actions must comply with unit SOP. Supervisors must make on-the-spot corrections of safety violations. Supervisors must ensure all hoist equipment has been load tested IAW AR and TB.</p> <p>REF: AR 385-10; FM 29-2; DA Pam 385-1; 385-4; TB 43-0142</p>
7-2	Submit workload status report by section.	Status reports are required by unit SOP and the battalion materiel officer.	<ol style="list-style-type: none"> 1. Each platoon/section must submit complete, accurate, up-to-date status report on all jobs on hand in the platoon/section to the maintenance control section as required. 2. When operating under an automated production control system, all associated requirements must be met. <p>REF: AR 335-15; TM 38-17</p>

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
7-4	Maintain tool and equipment accountability	Tool and equipment accountability required by AR and unit SOP. Loss of government property and non-accountable tool/equipment shortages must be handled IAW AP 735-11.	<p>Tools/equipment must be hand-receipted to the lowest practical user/section IAW AR and SOP. Proper action must be initiated when a shortage is discovered; i.e., report of survey, statement of charges, notification of unit supply personnel, etc.</p> <p>Periodic inventory of tools is conducted by supply personnel or shop/section supervisor.</p> <p>REF: AR 710-2; 735-11; TC 38-1; FM 29-2; FM 29-30-1; TM 9-243</p>
7-5	Maintain communications with maintenance control section (MCS).	Maintenance teams are operating in support of assigned units.	<ol style="list-style-type: none"> 1. Team must establish and maintain communications with maintenance control section (MCS). 2. Keep the MCS abreast of team location and activity. 3. Advise the MCS of the location and condition of disabled weapons systems and combat vehicles. 4. Advise the MCS of requirements for repair parts and replenishment of stockage items. <p>REF: FM 29-30-1; RDOM 29-304</p>

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
7-7	Supervise TAMMS and supply requirements.	The team/section chief is responsible for maintenance administration and supply.	<ol style="list-style-type: none"> 1. The team/section chief will insure proper preparation, maintenance, and disposition of records IAW TM 38-750. 2. Insure that repair parts supplies are available in sufficient quantity and that adequate control procedures are maintained. <p>REF: TM 38-750</p>
8-5	Repair tracked vehicles.	Section has received DA 2407, Maintenance Request, for the repair of tracked vehicles.	<ol style="list-style-type: none"> 1. DA Forms 2404/2407 are reviewed to determine required repairs. 2. Necessary tools, hoist equipment and/or repair parts are acquired. 3. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel. 4. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards. 5. Completion of work must be verified. 6. DA Form 2404/2407 and associated TAMMS forms are completed IAW TM 38-750. 7. Prepare and turn in un-serviceable repair parts. 8. Repaired item must be sent to final inspection. 9. When operating under an automated system completion of production control procedures will be IAW the requirements of the automated system. <p>REF: TM 38-750; and Applicable TM & SM</p>

ARTEP TASKS, CONDITIONS AND STANDARDS

TASK NO	TASK	CONDITIONS	TRAINING/EVALUATION STANDARDS
8-6	Repair wheel equipment	Section has received DA Form 2407, Maintenance Request, for the repair of wheel vehicles.	<ol style="list-style-type: none"> 1. DA Forms 2404/2407 are reviewed to determine required repairs. 2. Necessary tools, hoist equipment and/or repair parts are acquired. 3. Proper security measures are initiated while job is under maint activity control. 4. Repairs are performed IAW applicable TM and SM; in-process inspections are performed by qualified shop personnel. 5. Repairs are completed within a reasonable time frame consistent with prevailing conditions and published standards. 6. Completion of work must be verified. 7. DA Forms 2404/2407 and associated TAMMS forms are completed IAW TM 38-750. 8. Prepare and turn in unserviceable repair parts. 9. Repaired item must be sent to final inspection 10. When operating under an automated system completion of production control procedures will be IAW the requirements of the automated system. <p>REF: TM 38-750, and Applicable TM & SM</p>